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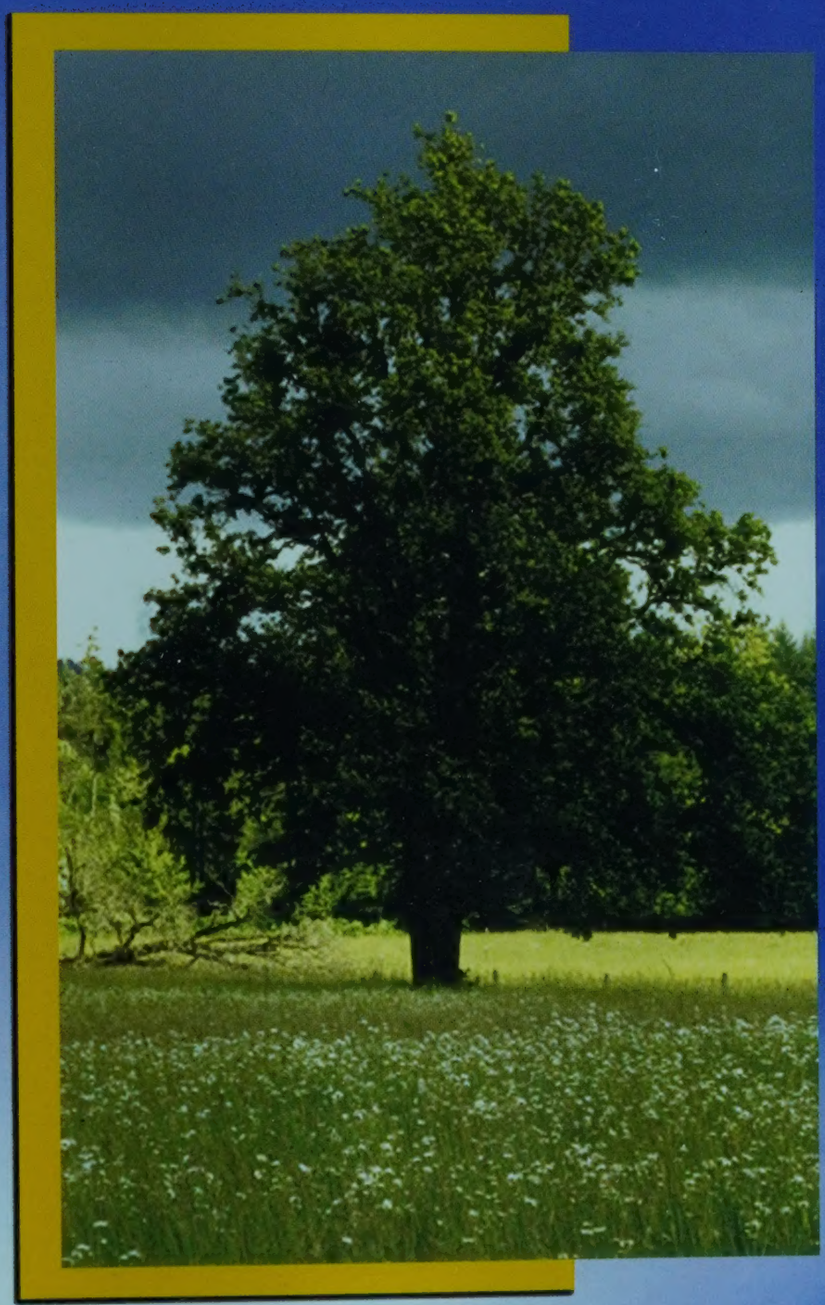
KARNATAKA

HANDBOOK

on Environmental Legislations and Technologies



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KARNATAKA STATE POLLUTION CONTROL BOARD

Our Vision

..... a Cleaner
Greener Environment

Our Mission

..... a commitment towards
a pollution free environment
for better quality of life

HANDBOOK

on Environmental Legislations and Technologies

COMMUNITY HEALTH CELL
LIBRARY AND INFORMATION CENTRE
BANGALORE

Karnataka State Pollution Control Board
Bangalore

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MESSAGE

The Government of India has promulgated number of Acts and Rules for protecting the environment. To comply with these statutory requirements industries and other organizations have to provide appropriate pollution control systems. Both regulators and regulated community would need simplified version of statutory procedure to be complied with and also the information on the technologies and best practices available for compliance.

I hope this Handbook brought out by the Board will meet this need. I appreciate the efforts put in by the officers of the Board in compiling this varied information into a simple and useful format.

N. Bhoomanand Manay
Chairman
Karnataka State Pollution Control Board

COMMUNITY HEALTH
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BANGALORE

FOREWORD

The Karnataka State Pollution Control Board is implementing the legislations relating to prevention and control on pollution of water and air and also environment protection. There are specific legislations relating to management of Hazardous Waste, Bio Medical Waste, Municipal Solid Waste etc.,

The Board is required to disseminate information relating to both the statutory requirement as well as the best practices in order to prevent pollution. I hope this Handbook will fulfill this requirement.

I am sure this Handbook will be useful reference material for the regulators, professionals, industries, local bodies, consultants and other stake holders.

I must appreciate the efforts put by all the officers of the Board involved in this exercise and without their commitment and dedication such work would not have been possible. I would like to acknowledge the valuable advice and support given by our Hon'ble Chairperson, Sri. N. Bhoomanand Manay. My special thanks to Sri. S. Ramakrishna, Sri. S. Nanda Kumar, Sri. C.D. Kumar and Sri. N.R. Raju

B. Ramaiah
Member Secretary
Karnataka State Pollution Control Board

CONTENTS

1. **Introduction**
2. **Environmental Legislations-overview** 1
   - 2.1. Water (Prevention and Control of Pollution) Act, 1974 4
   - 2.2. Water (Prevention and Control of Pollution) Cess Act, 1977 11
   - 2.3. Air (Prevention and Control of Pollution) Act, 1981 16
   - 2.4. Environment (Protection) Act, 1986 22
   - 2.5. The Public Liability Insurance Act, 1991 26
   - 2.6. The National Environment Tribunal Act, 1995 27
   - 2.7. The National Environment Appellate Authority Act, 1997 29
3. **Rules & Notifications-Salient Features** 31
   - 3.1. Rules notified by Government of India 33
     - 3.1.1. Environment (Protection) Rules, 1986 33
     - 3.1.2. Hazardous Wastes (Management & Handling) Rules, 1989 35
     - 3.1.3. The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 42
     - 3.1.4. Rules for the Manufacture, Use, Import, Export & Storage of Hazardous Micro-Organisms/Genetically Engineered Organisms or Cells, 1989. 46
     - 3.1.5. Chemical Accidents (Emergency, Planning, Preparedness & Response) Rules 1996. 47
     - 3.1.6. Bio-medical Waste (Management & Handling) Rules, 1998 49
     - 3.1.7. Plastics Manufacture, Sale and Usage Rules, 1999 55
     - 3.1.8. Municipal Solid waste (Management & Handling) Rules 2000 58
     - 3.1.9. The Noise Pollution (Regulation & Control) Rules, 2000 62
     - 3.1.10. The Batteries (Management & Handling) Rules, 2001 66
   - 3.2. Notification of Ministry of Environment & Forests 70
     - 3.2.1. Coastal Regulation Zone Notification, 1991 70
     - 3.2.2. Environment Impact Assessment Notification 1994 71
     - 3.2.3. Use of Fly Ash, Bottom Ash or Pond Ash in the Manufacture of Bricks and other Construction activities 82
     - 3.2.4. Scheme for Labelling of Environmental Friendly Products 85
     - 3.2.5. Uniform Protocol on Water Quality Monitoring 87
   - 3.3. Notifications issued by Government of Karnataka 99
     - 3.3.1. Environment Clearance by State Environment Clearance Committee 99
     - 3.3.2. Restriction on Activities in Tippagondana Halli Reservoir Catchment Area 101
     - 3.3.3. Restriction on use of Drinking Water for Non-potable purposes in Bangalore City 104
     - 3.3.4. Analysis fee structure 105

4. Guidelines 107

4.1. General guidelines for siting of industries 109

4.2. Policy guidelines for siting, Air pollution control measures & standards for stone crushing units in Karnataka State 112

4.3 Siting Guidelines For Orange & Green Category Units 114

4.4. Guidelines for Sponge Iron units 115

4.5. Guidelines for setting up Hazardous Waste Operating Facility 120

4.6. Guidelines for Common Bio-medical Waste Treatment Facility 129

4.7. Specification for Municipal Solid Waste landfill site 132

4.8. Guidelines for Waste Water Management System 136

4.9. Guidelines for Air Pollution Control Management 143

5. Environmental Standards 159

5.1. Characteristics of Drinking Water 161

5.2. Primary Water Quality Criteria for Bathing Water 164

5.2.1. Primary Water Quality Criteria for various used Laid Down by Central Pollution Control Board 165

5.3. General Standards for Discharge of Environmental Pollutants 166

5.4. National Ambient Air Quality Standards 169

5.5. Industry Specific Standards 170

5.5.1. Chlor Alkali (Caustic Soda) 170

5.5.2. Man Made Fiber 171

5.5.3. Oil Refinery 172

5.5.4. Sugar Industry 172

5.5.5. Thermal Power Plant 173

5.5.6. Dye & Dye Intermediate Industry 175

5.5.7. Electroplating Industry 176

5.5.8. Cement Industry 177

5.5.9. Coke Ovens 177

5.5.10. Beehive Hard Coke Oven 179

5.5.11. Small Pulp & Paper Industry 180

5.5.12. Large Pulp & Paper 180

5.5.13. Fermentation Industry 181

5.5.14. Tannery 181

5.5.15. Leather Tanneries 182

5.5.16. Fertilizer Industry 182

5.5.17. Sulphuric Acid Plant 185

5.5.18. Nitric Acid Plant 185

5.5.19. Integrated Iron & Steel Plant 186

5.5.20. Soft Coke Industry 186

5.5.21. Foundries 187

5.5.22. Re-Heating (Reverberatory) Furnaces 187
5.5.23. Petrochemicals (Basic & Intermediates 188
5.5.24. Pharmaceuticals Industry (Bulk Drugs) 188
5.5.25. Pharmaceutical Manufacturing and Formulation Industry 189
5.5.26. Pesticide Manufacturing and Formulation Industry 190
5.5.27. Pesticide Industry 192
5.5.28. Inorganic Chemical Industry 194
5.5.29. Organic Chemicals Manufacturing Industry 195
5.5.30. Synthetic Rubber 195
5.5.31. Natural Rubber Processing Industry 196
5.5.32. Natural Rubber Industry 196
5.5.33. Cotton Textile Industries 197
5.5.34. Textile Industry 197
5.5.35. Glass Industry 198
5.5.36. Slaughter House, Meat & Sea Food Industry 199
5.5.37. Food & Fruit Processing Industry 199
5.5.38. Common Effluent Treatment Plants 200
5.5.39. Dairy Industry 202
5.5.40. Edible Oil & Vanaspati Industry 202
5.5.41. Flour Mills 203
5.5.42. Starch Industry (Maize Products) 203
5.5.43. Stone Crushing Unit 204
5.5.44. Aluminium Plants 204
5.5.45. Calcium Carbide Plant 205
5.5.46. Carbon Black Industry 205
5.5.47. Asbestos Manufacturing Industry 205
5.5.48. Lime Kilns 206
5.5.49. Brick Kilns 206
5.5.50. Bagasse-Fired Boilers 207
5.5.51. Boiler (Small) 207
5.5.52. Boilers Using Agriculture Waste as Fuel 209
5.5.53. Ceramic Industry 209
5.5.54. Battery Manufacturing Industry 211
5.5.55. Noise Standards for the Source 212
5.5.56. Noise Standards for Fire Crackers 213
5.5.57. Guidelines for Pollution Control in Ginning Mills 213
5.5.58. Noise Limit for Generator Sets run with Petrol or Kerosene 214
5.5.59. Emission Limits for New Diesel Engine (Up to 800 KW) for Generator Sets (Gensets) Applications 214

5.5.60. Water Quality Standards for Coastal Water Marine Outfalls 215

5.5.61. Emission Standards for Diesel Engines (Engine Rating more than 0.8 MW (800 KW) for power plant. Generator set applications and other Requirements 215

6. Consent, Authorization & Registration Management Practices 217

6.1. Consent and Authorizations 221

6.1.1. Consent for Establishment (CFE) 221

6.1.2. Consent for Operation (CFO) 222

6.1.3. Authorization under Hazardous Waste Management Rules 223

6.1.4. Authorization under Municipal Solid Waste Rules 223

6.1.5. Authorization under Bio-Medical waste Rules 224

6.1.6. Registration under Plastic Manufacture, sale and Usage Rules 224

6.2. Periodicity of Consent Renewal/authorization 225

6.3. Applications/Forms & minimum time required for disposal of completed application/forms. 226

6.4. Appeals against the Board's decisions 227

6.5. Forms/Returns prescribed in the Environmental laws 228

6.6. Definition of Capital Investment 230

6.7. Consent Fee Structure 232

6.8. Classification of industries 233

6.8.1. Red category of industries 233

6.8.2. Orange category of industries 237

6.8.3. Green category of industries 238

7. Environment Management Tools 243

7.1. Environmental Management Systems (EMS) 245

7.2. Charter on Corporate Responsibility for Environmental Protection (CREP) 246

7.2.1. Aluminium Industry 246

7.2.2. Cement Industry 247

7.2.3. Chlor-Alkali Industry 248

7.2.4. Copper Industry 248

7.2.5. Distilleries 249

7.2.6. Dyes & Dye Intermediates 249

7.2.7. Fertilizer Industry 250

7.2.8. Integrated Iron & Steel Industry 252

7.2.9. Oil Refineries 254

7.2.10. Pesticides Industry 254

7.2.11. Petrochemicals 256

7.2.12. Pharmaceuticals 257

7.2.13. Pulp & Paper Industry 258
7.2.14. Sugar Industry 259
7.2.15. Tannery 259
7.2.16. Thermal Power Plants 261
7.2.17. Zinc Industry 262
7.3. Generic Structure of Environmental Impact Assessment Document 263
7.4. Best Practices for Selected Industries 265
7.4.1. Water Management & Waste Water Recycling in Sugar Industry 265
7.4.2. Spent Wash Management in Distilleries 269
7.4.3. ECO Friendly Chromium Plating Technology 281
7.4.4. Integrated Iron & Steel Industry 283
7.4.5. Mining Operating 284
7.4.6. Sanitation in Slaughter House 285

8. Other Topics 289
8.1. Policy Statement for Abatement of Pollution 1992 291
8.2. E-Waste Management 297
8.3. Decentralised Wastewater Treatment 299
8.4. The Ozone Layer 300
8.5. Rain Water Harvesting 301
8.6. List of Important Multilateral Treaties and Other Agreements In the Field of Environment 303
8.7. International Declarations 304
8.8. GHG Mitigation Programme 305
8.9. World Environment Day 308
8.10. Miscellaneous 310
8.10.1. Conversion Factors 310
8.10.2. Water Availability on earth 311
8.10.3. Checklist for water/wastewater Sampling 312
8.10.4. Major chemical disasters in India after Bhopal gas tragedy 313

Disclaimer

All efforts have been made to make this information as accurate as possible, the Karnataka State Pollution Control Board will not be responsible for any loss to any person caused by inaccuracy in the information available in this book. Relevant Official Gazettes/office memorandums/circulars/notifications maybe consulted for an accurate information. Any discrepancy found may be brought to our notice.

1. INTRODUCTION

One of the prices paid for progress and development is deterioration in the quality of the environment. This arises because of the increasing practice of exploiting the resources of the environment and the resultant interferences with various components of the environment. There is also an increasing public awareness about the adverse effects arising out of development.

The industry considers production and pollution as joint outputs and pollution is an inevitable evil. It is well understood that any developmental activity will have impact on environment, but to what extent degradation is tolerable for a sustainable development is to be understood. It is therefore necessary to control pollution of all types.

It should be understood that pollution control is not an additional cost which is wasteful and it is not a non productive investment. Though pollution control does cost money both initial and running, we reiterate that there are substantial benefits which helps improve technology, reduce raw material costs, recycle resources, etc. Cost of controlling pollution can perhaps be best understood by examining the other side of the coin that is by assuming the cost of not controlling the pollution.

The above mentioned environmental issues could be addressed only with the active cooperation and proactive involvements of all stakeholders to ensure the safe & healthy environment for current and future generation. Knowledge of the statutory requirements and technological developments in pollution prevention are crucial for achieving the above goal. This hand book has been brought out keeping the above requirement in mind and hope this will equip the stakeholders in this endeavour

2. ENVIRONMENTAL LEGISLATIONS - Overview

ENVIRONMENTAL LEGISLATIONS

The various Environmental Legislations are as follows:

Year	Environmental Legislation
1974	The Water (Prevention and Control of Pollution) Act.
1975	The Water (Prevention and Control of Pollution) Rules.
1976	The Karnataka State Pollution Control Board for Prevention and Control of Water Pollution (Procedure for transaction of business) and Water (Prevention and Control of Pollution) Rules.
1977	The Water (Prevention and Control of Pollution) Cess Act.
1978	The Water (Prevention and Control of Pollution) Cess Rules.
1981	The Air (Prevention and Control of Pollution) Act.
1983	The Air (Prevention and Control of Pollution) Rules.
1983	The Karnataka Air (Prevention and Control of Pollution) Rules.
1986	The Environment (Protection) Act.
1986	The Environment (Protection) Rules.
1991	The Public Liability Insurance Act.
1991	The Public Liability Insurance Rules.
1995	The National Environment Tribunal Act.
1997	The National Environment Appellate Authority Act
1997	The National Environment Appellate Authority (Appeal) Rules.

Rules/Notifications under Environment (Protection) Rules.

1989	Hazardous Wastes (Management and Handling) Rules.
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
1989	Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organisms, Genetically Engineered Organisms or Cells.
1991	Coastal Regulation Zone Notification
1991	Scheme on Labeling of Environment friendly products (Eco-mark).
1994	Environmental Impact Assessment Notification.
1996	Chemical Accidents (Emergency, Planning Preparedness and Response) Rules,
1998	Bio-medical Waste (Management & Handling) Rules
1999	Plastics Manufacture, Sale and Usage Rules.
1999	Use of Fly Ash, Bottom Ash or Pond Ash in the manufacture of Bricks & other construction activities.
2000	Noise Pollution (Regulation & Control) Rules
2000	Ozone Depleting Substances (Regulation & Control) Rules.
2000	Municipal Solid Wastes (Management & Handling) Rules.
2001	Batteries (Management and Handling) Rules

2.1 WATER (PREVENTION AND CONTROL OF POLLUTION) ACT, 1974.

Objective:

Water (Prevention & Control of Pollution) Act, 1974, is an Act to provide for prevention and control of water pollution and maintaining or restoring of wholesomeness of water.

Salient features:

- No person shall discharge any poisonous, noxious or polluting matter detrimental to the water body, or on land, or into well or stream whether the same is dry for the time being or full.
- The discharge of any trade effluent or sewage shall be regulated as per the consent of the State Board. Such discharge has to meet the standards prescribed by the State Board.
- New industry shall obtain the consent for establishment of the Board for operation or process or any treatment and disposal system or an extension or addition thereto which is likely to discharge sewage and/or trade effluent.
- New industries prior to commissioning (after consent for establishment) shall obtain consent of the State Board for discharge of sewage and/or trade effluent.
- The Act provides for issue of direction by the Board to any industry for its closure, prohibition or regulation of any operation or process, or the stoppage or regulation of supply of electricity, water or any other service, in cases of non-compliances and danger to the environment.
- Any contravention of the provisions of the statute will attract penal action, which includes fine & imprisonment.

Important Definitions
(Section 2):

(a) **"Occupier"** in relation to any factory or premises means, the person who has control over the affairs of the factory or the premises and includes in relation to any substance, the person in possession of the substance.

(b) **"Outlet"** includes any conduit pipe or channel, open or closed, carrying sewage or trade effluent or any other holding arrangement, which causes or is likely to cause pollution.

(i) **"new or altered outlet"** means any outlet which is wholly or partly constructed on or after the commencement of this Act or which (whether to constructed or not) is substantially altered after such commencement;

(ii) **"new discharge"** means a discharge which is not, as respects the nature and composition, temperature, volume, and rate of discharge of the effluent substantially a continuation of a discharge made within the preceding twelve months (whether by the same or different outlet), so however that a discharge which is in other respects a continuation of previous discharge made as aforesaid shall not be deemed to be a new discharge by reason of any reduction of the temperature or volume or rate of discharge of the effluent as compared with the previous discharge.

(c) **"Pollution"** means, such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

(d) **"Sewage effluent"** means, effluent from any sewerage system or sewage disposal works and includes sullage from open drains.

(e) **"Sewer"** means, any conduit pipe or channel, open or closed, carrying sewage or trade effluent.

(f) **"Stream"** includes -

(i) river

(ii) water course (whether flowing or for the time being dry)

(iii) inland water (whether natural or artificial)

(iv) sub-terranean waters

(v) sea or tidal waters to such extent or, as the case may be, to such point as the State Government may, by notification in the Official Gazette, specify in this behalf (5 Knotical Miles).

(g) **"Trade effluent"** includes any liquid, gaseous or solid substance, which is discharged from any premises, used for carrying on any (industry, operation or process, or treatment and disposal system) other than domestic sewage.

Collection of information

(Section 20):

Empowers the Board to obtain information and also give directions requiring any person to furnish details regarding activities.

Sample collection for analysis

(Section 21):

1. A State Board or any officer empowered by it in this behalf shall have power to take for the purpose of analysis of samples of water from any stream or well or samples of any sewage or trade effluent which is passing from any plant or vessel or from or over any place into any such stream or well.
2. The result of any analysis of a sample of any sewage or trade effluent taken under sub-section (1) shall not be admissible in evidence in an legal processing unless the provisions of sub-sections (3), (4) and (5) are complied with.
3. Subject to the provisions of sub-sections (4) and (5), when a sample (composite or otherwise as may be warranted by the process used) of any sewage or trade effluent is taken for analysis under sub-section (1), the persons taking the sample shall-

(a) serve on the person in charge of, or having control over, the plant or vessel or in occupation of the place (which person is hereinafter referred to as the occupier) or any agent of such occupier, a notice, then and there in such form as may be prescribed of his intention to have it so analysed;

(b) in the presence of the occupier or his agent, divide the sample into two parts;

(c) cause each part to be placed in a container which shall be marked and sealed and shall also be signed both by the person taking the sample and the occupier or his agent;

(d) send one container forthwith,-

(i) in a case where such sample is taken from any area situated in a Union Territory, to the laboratory established or recognized by the Central Board and

(ii) in any other case, to the laboratory established or recognized by the State Board ;

(e) on the request of the occupier or his agent, send the second container,-

(i) in a case where such sample is taken from any area situated in a Union Territory, to the central water laboratory established or specified by the Central Government under sub-section (1) of Section 51; and

(ii) in an other case, to the state water laboratory established or specified by the State Government the provisions of the Act.

4. When a sample of any sewage or trade effluent is taken for analysis under sub-section

(1) and the person taking the sample serves on the occupier or his agent, a notice under clause (a) of sub-section (3) and the occupier or his agent willfully absents himself, then,-

(a) the sample so taken shall be placed in a container which shall be marked and sealed and shall also be signed by the person taking the sample and the same shall be sent forthwith by such person for analysis to the laboratory referred to in subclause (i) or sub-clause (ii), as the case may be, of clause (e) of sub-section (3) and such person shall inform the Government analyst appointed under subsection (1) or sub-section (2), as the case may be, of Section 53, in writing about the willful absence of the occupier or his agent; and

(b) the cost incurred in getting such sample analysed shall be payable by the occupier or his agent and in case of default of such payment, the same shall be recoverable from the occupier or his agent, as the case may be, as an arrears of land revenue or of public demand;

Provided that no such recovery shall be made unless the occupier, or, as the case may be, his agent has been given a reasonable opportunity of being heard in the matter.

5. When a sample of any sewage or trade effluent is taken for analysis under sub-section (1) and the person taking the sample serves on the occupier or his agent a notice under clause (a) of sub-section (3) and the occupier or his agent who is present at the time of taking the sample does not make a request for dividing the sample into two parts as provided in clause (b) of sub-section (3), then, the sample so taken shall be placed in a container which shall be marked and sealed and shall also be signed by the person taking the sample and the same shall be sent forthwith by such person for analysis to the laboratory referred to in sub-clause (i) or sub-clause (ii), as the case may be, of clause (d) of sub-section (3).

Inspection

(Section 23):

Empowers the Board officials to inspect the industry, effluent treatment plant & sewage treatment plant, etc. Also, empowers to seize documents, register, record or other material object for the purpose of establishing evidence of the commission of an offence punishable under this Act.

Prohibition on use of stream or well for disposal of Polluting matter.

(Section 24):

Prohibits the pollution of stream or well or sewer or on land by disposal of polluting matter etc., or no person shall knowing cause or permit any poisonous, noxious or polluting matter into any stream or well or sewer or on land.

Restriction on new outlets and new discharges

(Section 25):

1. Subject to the provisions of this section, no person shall, without the previous consent of the State Board,-

   (a) establish or take any steps to establish any industry, operation or process, or any treatment and disposal system or an extension or addition thereto, which is likely to discharge sewage or trade effluent into a stream or well or sewer or on land (such discharge being hereafter in this section referred to as discharge of sewage); or

   (b) bring into use any new or altered outlets for the discharge of sewage; or

   (c) begin to make any new discharge of sewage;

2. An application for consent of the State Board under sub-section (1) shall be made in such form contain such particulars and shall be accompanied by prescribed fees.

3. The State Board may make such inquiry as it may deem fit in respect of the application for consent referred to in sub-section (1) and in making any such inquiry shall follow such procedure as may be prescribed.

4. The State Board may-

   (a) grant its consent referred to in sub-section (1), subject to such conditions as it may impose, being-

      (i) in cases referred to in clauses (a) and (b) of sub-section (1) of Section 25, conditions as to the point of discharge of sewage or as to the use of that outlet or any other outlet for discharge of sewage;

      (ii) in the case of a new discharge, conditions as to the nature and composition, temperature, volume or rate of discharge of the effluent from the land or premises from which the discharge or new discharge is to be made; and

      (iii) that the consent will be valid only for such period as may be specified in the order, and any such conditions imposed shall be binding on any person establishing or taking any steps to establish any industry, operation or process, or treatment and disposal system or extension or addition thereto, or using the new or altered outlet, or discharging the effluent from the land or premises, aforesaid; or

   (b) refuse such consent for reasons to be recorded in writing.

5. Where, without the consent of the State Board, any industry operation or process, or any treatment and disposal system or any extension or addition thereto, is established, or any steps for such establishment have been taken or a new or altered outlet is brought into use for the discharge of sewage or a new discharge of sewage is made, the State Board may serve on the person who has established or taken steps to establish any industry, operation or process, or any treatment and disposal system or any extension or addition thereto, or using the outlet, or making the discharge, as the case may be, a notice imposing any such conditions as it might have imposed on an application for its consent in respect of such establishment, such outlet or discharge.

6. Every State Board shall maintain a register containing particulars of conditions imposed for inspection at all reasonable hours by any person interested in, or affected by such outlet, land or premises, as the case may be, or by any person authorized by him in this behalf.

7. The consent referred to in sub-section (1) shall, unless given or refused earlier, be deemed to have been given unconditionally on the expiry of a period of four months of the making of an application in this behalf complete in all respects to the State Board.

Refusal or withdrawal or review of Refusal of Consent.

(Section 27):

Empowers the Board to refuse, withdrawal, review of conditions and the review of refusal of the consent

Appeal

(Section 28):

Provides for appeal against the orders of the Board under Section 25 or 26 or 27. Appeal has to be made to the Appellate Authority i.e, The Appellate authority, 6th Floor, Public utility Building, M.G.Road. Bangalore-560001, within 30 days of the date of communication of the order.

Power of the State Board to carry out certain works

(Section 30):

Empowers the Board to carryout certain works when the person concerned has failed to carry out the directions of the Board and to recover the cost from such person.

Emergency measure in case of pollution of stream or well

(Section 32):

Where it appears to the State Board that any poisonous, noxious or polluting matter is present in any stream or well or on land by reason of the discharge of such matter in such stream or well or on such land or has entered into that stream or well due to any accident or other unforeseen act or event, and if the Board is of opinion that is necessary for all or any of the following purposes, that is to say,-

(a) issuing orders immediately restraining or prohibiting the persons concerned from discharging any poisonous, noxious or polluting matter into the stream or well or on land or from making insanitary use of the stream or well.

Power of the Board to make application to court

(Section 33):

1. Where it is apprehended by a Board that the water in any stream or well is likely to be polluted by reason of the disposal or likely disposal of any matter in such stream or well or in any sewer, or on any land, or otherwise, the Board may make an application to a court, not inferior to that of a Metropolitan Magistrate or a Judicial Magistrate of the first class, for restraining the person who is likely to cause such pollution from so causing.
2. On receipt of an application under sub-section (1), the court make such order as it deems fit.
3. Where under sub-section (2), the court makes an order restraining any person from polluting the water in any stream or well, it may in that order-

   (i) direct the person who is likely to cause or has caused the pollution of the water in the stream or well, to desist from taking such action as is likely to cause pollution or, as the case may be, to remove such stream or well, such matter, and

   (ii) authorize the Board, if the direction under clause (i) (being a direction for the removal of any matter from such stream or well) is not complied with by the person to whom such directions is issued, to undertake the removal and disposal of the matter in such manner as may be specified by the court.

4. All expenses incurred by the Board in removing any matter in pursuance of the authorization under clause (ii) of sub-section (3) or in the disposal of any such matter may be defrayed out of any money obtained by the Board from such disposal and any balance outstanding shall be recoverable from the person concerned as arrears of land revenue or of public demand.

Power to give directions

(Section 33 A):

Notwithstanding anything contained in any other law, but subject to the provisions of this Act, and to any directions that the Central Government may give in this behalf, a Board may, in the exercise of its powers and performance of its functions under this Act, issue any directions in writing to any person, officer or authority, and such person, officer or authority shall be bound to comply with such directions.

Explanation - For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct-

(a) the closure, prohibition or regulation of any industry, operation or process; or

(b) the stoppage or regulation of supply of electricity, water or any other service.

Penalties

(Section 41):

1. Whoever fails to comply with any direction given under sub-section (2) or subsection (3) of Section 20 within such time as may be specified in the direction shall, on conviction, be punishable with imprisonment for a term which may extend to three months or with fine which may extend to ten thousand rupees or with both and in case the failure continues, with an additional fine which may extend to five thousand rupees for every day during which such failure continues after the conviction for the first such failure.
2. Whoever fails to comply with any order issued under clause (c) of sub-section (1) of Section 32 or any direction issued by a court under sub-section (2) of Section 33 or any direction issued under Section 33A shall, in respect of each such failure and on conviction, be punishable with imprisonment for a term which shall not be less than one year and six months but which may extend to six years and with fine, and in case the failure continues, with an additional fine which may extend to five thousand rupees for every day during which such failure continues after the conviction for the first such failure.
3. If the failure referred to in sub-section (2) continues beyond a period of one year after the date of conviction, the offender shall, on conviction, be punishable with imprisonment for a term which shall not be less than two years but which may extend to seven years and with fine.

Penalty for certain Acts

(Section 42):

1. Whoever-

I. destroys, pulls down, removes, injures or defaces any pillar, post or stake fixed in the ground or any notice or other matter put up, inscribed or placed, by or under the authority of the Board, or

II. obstructs any person acting under the orders or directions of the Board from exercising his powers and performing his functions under this Act, or

III. damages any works or property belonging to the Board, or

IV. fails to furnish to any officer or other employee of the Board any information required by him for the purpose of this Act, or

V. fails to intimate the occurrence of an accident or other unforeseen act or event under Section 31 to the Board and other authorities or agencies as required by that section, or

VI. in giving any information which he is required to give under this Act, knowingly or willfully makes a statement which is false in any material particular, or

VII. for the purpose of obtaining any consent under Section 25 or Section 26, knowingly or willfully makes a statement which is false in any material particular, shall be punishable with imprisonment for a term, which may extend to three months or with fine, which may extend to ten thousand rupees or with both.

2. Where for the grant of a consent in pursuance of the provisions of Section 25 or Section 26, the use of a meter or gauge or other measure or monitoring device is required and such device is used for the purposes of those provision, any person who knowingly or willfully alters or interferes with the device so as to prevent it from monitoring or measuring correctly shall be punishable with imprisonment for a term which may extend to three months or with fine which may extend to ten thousand rupees or with both.

Penalty for contravention of provisions of Section-24

(Section 43):

Whoever contravenes the provisions of Section 24 shall be punishable with imprisonment for a term, which shall not be less than one year and six months but which may extend to six years, and with fine.

Penalty for contravention of provisions of Section-25

(Section 44):

Whoever contravenes the provision of Section 25 or Section 26 shall be punishable with imprisonment for a term which shall not be less than two years but which may extend to six years and with fine.

Cognizance of Offences

(Section 49):

1. No court shall take cognizance of any offence under this Act except on a complaint made by-

   (a) a Board or any Officer authorized in this behalf by it; or

   (b) any person who has given notice of not less than sixty days, in the manner prescribed, of the alleged offence and of his intention to make a complaint, to the Board or Officer authorized as aforesaid, and no court inferior to that of a Metropolitan Magistrate or a Judicial Magistrate of the first class shall try any offence punishable under this Act.

2. Where a complaint has been made under Clause (b) of sub-section (1), the Board shall, on demand by such person, make available the relevant reports in its possession to that person:

   Provided that the Board may refuse to make any such report available to such person if the same is, in its opinion, against the public interest.

3. Notwithstanding anything contained in Section 29 of the Code of Criminal Procedure, 1973, (2 of 1974) it shall be lawful for any Judicial Magistrate of the first class or for any Metropolitan Magistrate to pass a sentence of imprisonment for a term exceeding two years or of fine exceeding two thousand rupees on any person convicted of an offence punishable under this Act.

Bar of jurisdiction

(Section 58):

No Civil Court shall have jurisdiction to entertain any suit or proceedings in respect of any matter, which an Appellate Authority constituted under Water Act is empowered to determine.

2.2. WATER (PREVENTION AND CONTROL OF POLLUTION) CESS ACT, 1977.

Objective:

The purpose of this Act is to levy and collect cess on water consumed by persons carrying on industries and by local bodies, with a view to augment the resources of the Central & the State Board for prevention and control of Water Pollution.

Salient features:

- Water cess is levied based on the water consumed by every person carrying on any industry and for domestic use by every local authority. Cess is calculated on the rate specified for different water uses.
- For quantification of water use, the local body or industry as the case may be under the Act shall affix water-meters at places of intake into various process, operation and for domestic use.
- The industry and local body consuming water shall furnish the cess returns in the prescribed form on or before 5th of every month to the respective Regional Office.
- The returns filed will be assessed after due verification and amount payable will be intimated to the users, which shall be paid by Demand Draft. If the person carrying on any industry or any local body fails to pay the cess within the date specified, shall be liable to pay an interest of 2% every month or part of the month till such amount is actually paid.
- If the person fails to pay cess, a penalty equivalent to the cess assessed shall be levied after due opportunity of hearing and the same will be recovered as arrears of land revenue.
- If the industry/local body complies with the Regulation, i.e, by providing effluent treatment plant, meeting standards prescribed in terms of quality & quantity, rebate of 25% is entitled.
- If the industry or local body consuming water, fails to furnish cess returns, the Authority will issue a Suo-Moto Notice and assess the amount of cess payable.
- If any person is aggrieved of the assessment can prefer an Appeal before an Appellate Authority within a period of 30 days from such assessment order.

Important Definitions

(Section 2):

(a) **"Local authority"** means, a municipal corporation or a municipal council (by whatever name called) or a Cantonment Board or any other body, entrusted with the duty of supplying the water under the law by or under which it is constituted;

(b) **"Industry"** includes any operation or process, or treatment and disposal system, which consumes water or gives rise to sewage effluent or trade effluent , but doesnot include Hydel Power Unit.

(c) Words and expressions used but not defined in this Act and defined in the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) shall have the meanings respectively assigned to them in that Act.

Levy and collection of Cess

(Section 3):

The Assessing Authority under the Act levies and collects cess based on the amount of water consumed by industries, the rate is also determined by the purpose for which the water is used. The specified rates are given below .

SCHEDULE-II

Purpose for which water is consumed	Maximum rate under Sub-Section (2) of Section (3)	Maximum rate under Sub-Section (2A) Section 3
1. Industrial cooling spraying in mine pits or boiler feeds.	Five paise per Kilolitre	Ten paise per kilolitre
2. Domestic purpose	Two paise per Kilolitre	Three paise per kilolitre
3. Processing whereby water gets polluted and the pollutants are (i) easily biodegradable or (ii) non toxic; or (iii) both non-toxic & not easily biodegradable.	Ten paise per Kilolitre	Twenty paise per Kilolitre
4. Processing whereby water gets polluted and the pollutants are not (i) easily biodegradable or (ii) toxic; or (iii) both toxic & not easily biodegradable.	Fifteen paise per Kilolitre	Thirty paise per Kilolitre

Affixing of water meters

(Section 4):

The industries and local bodies are required to install standard water meters at such places as may be required by the concerned authority for measuring and recording the quantity of water consumed by the industry.

Furnishing of Returns

(Section 5):

1. Every person carrying on any industry and every local authority, liable to pay the cess under Section 3, shall furnish such returns, in such form at such intervals and containing such particulars to such officer or authority, as may be prescribed.
2. If a person carrying on any industry or a local authority, liable to pay the cess under Section 3, fails to furnish any return under sub-section (1), the officer or the authority shall give a notice requiring such person or local authority to furnish such return before such date as may be specified in the notice.

Assessment of Cess

(Section 6 (1)):

The officer of authority to whom or which the return has been furnished under Section 5 shall, after making or causing to be made such inquiry as he or it thinks fit and after satisfying himself or itself that the particulars stated in the return are correct, by order, assess the amount of cess payable by the concerned person carrying on any specified industry or local authority, as the case may be.

Suo Moto Assessment of Cess

(Section 6 (l-A)):

If the return has not been furnished to the officer or authority under sub-section (2) of Section 5, he or it shall after making or causing to be made such inquiry as he or it thinks fit, by order, assess the amount of cess payable by the concerned person carrying on any specified industry or local authority, as the case may be.

Cess Rebate

(Section 7):

The Act also provides for a 25% rebate on the cess payable to any person or local aurthority or industry consume water within the quantity prescribed for that category of industries and also comply with the effluent standards prescribed under the Water Act and the Environment (Protection) Act.

Provided that a person or local authority shall not be entitled to a rebate, if he or it -

(a) consumes water in excess of the maximum quantity as prescribed in Schedule under Rule 6 of Water Cess Rules in this behalf for any specified industry or local authority; or

(b) fails to comply with any of the provisions of Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or any of the standards laid down by the Central Government under the Environment (Protection) Act, 1986 (29 of 1986).

Interest payable for delay in payment of Cess

(Section 10):

If any industry or local authority fails to pay the cess amount within the date specified in the assessment order, they are liable for payment of interest for delay in payment at the rate of 2% for every month or part of a month till such amount is actually paid.

Penalty for non-payment of cess within the specified time

(Section 11):

Empower the Assessing Authority to impose penalty after giving an opportunity of being heard to the industry on the local authority. The penalty imposed shall not exceed the amount of cess in arrears.

Appeal

(Section 13):

1. Any person or local authority aggrieved by an order of assessment made under Section 6 or by an order imposing penalty made under Section 11 may, within such time as may be prescribed, appeal to such authority in such form and in such manner as may be prescribed. Chairman of Karnataka State Pollution Control Board is the Chairman of Appellate Authority.
2. Every appeal preferred under sub-section (1) shall be accompanied by such fees as may be prescribed (Rupees fifty only vide Rule 9 (4).)

3. After the receipt of an appeal under sub-section (1), the Appellate Authority shall, after giving the appellant an opportunity of being heard in the matter, dispose of the appeal as expeditiously as possible.
4. Every order passed in appeal under this section shall be final and shall not be called in question in any court of law.

Penalty

(Section 14):

1. Whoever, being liable to pay cess under this Act willfully or intentionally evades or attempts to evade the payment of such cess shall be punishable with imprisonment which may extend to six months or with fine which may extend to one thousand rupees or with both.
2. No court shall take cognizance of an offence punishable under this section serve on a complaint made by or under the authority of the Central Government.

Exemption :

(Section 16):

All industries consuming water less than 10 kilo liters per day are exempted from levy of cess provided that no such exemption shall be applicable in case the industries generating Hazardous Waste as defined in Hazardous waste (Management and handling) Rules

SCHEDULE (Rule 6 of Water Cess Rules)

Sl.No.	Name of Industry	Category	Maximum quantity of Water
1.	Ferrous Metallurgical	Integrated Iron and Steel	20 cubic meters per tonne of finished steel
2.	Non-ferrous Metallurgical	(a) Copper Smelters	100 cubic meters per tonne of copper produced.
		(b) Zinc smelters	50 cubic meters per tonne of Zinc metal produced.
3.	Chemical	(a) Caustic Soda (i) Mercury cell process	5 cubic meters per tonne of caustic soda produced (excluding cooling water) and 5 cubic meters per tonne of caustic soda produced for cooling water.
		(ii) Membrane Cell	5 cubic meters per tonne of caustic soda process including cooling water.
4.	Textile	(a) Manmade fiber (i) Nylon and Polyester	170 cubic meter per tonne of fibre produced.
		(ii) Viscose rayon	200 cubic meter per tonne of fibre produced.
5.	Paper	(a) Small pulp and paper (i) Agro-residue based	200 cubic meter per tonne of paper.
		(ii) Waste paper based	75 cubic meter pr tonne of paper.
		(b) Large pulp and Paper: (i) Pulp and paper	250 cubic meter per tonne of paper.
		(ii) Rayon grade pulp	200 cubic meter pr tonne of paper.

6.	Processing of animal or vegetable products industry including processing of milk, meat, hides and skins, all agricultural product and their waste	(a) Tanneries	30 cubic meter per tonne of raw hide.
		(b) Natural rubber	6 cubic meter per tonne of rubber.
		(c) Starch, glucose and related products	10 cubic meter per tonne of maize crushed.
		(d) Dairy	4 cubic meter per kilo litre of milk processed.
		e) Jute	1.5 cubic meter per tonne of jute processed.
		(f) Sugar	2 cubic meter per tonne of cane crushed.
		(g) Maltry	8.5 cubic meter per tonne of grain processed.
		(h) Brewery	1 cubic meter per kilo litre of beer produced.
		(i) Distillery	15 cubic meter per kilo litre of alcohol produced.

Rights:

- Opportunity for hearing before imposing penalty for non-payment of cess within the specified time.
- Right to appeal to the "Appellate Authority" in case of any grievance(s) against any Order of Assessment, in the prescribed form and along with the prescribed fee.

Obligation of Local Bodies towards Water Act & Water Cess Act.

Local authority means, Municipal Corporation or a Municipal Council (by whatever name called) or a cantonment Board or any other body.

Water Act:

The local authorities shall have to obtain consent from Pollution Control Board for discharging sewage effluent generated within their jurisdiction. A prescribed application form (Form-XIII) shall be used for obtaining the consent of the Board. The completed application form shall be submitted along with prescribed consent fee in the form of demand draft drawn in favour of, Karnataka State Pollution Control Board.

The local authorities shall provide facilities for collection, conveyance and treatment of sewage effluent generated in their jurisdiction to the standards prescribed by the Board.

The consent for operation of sewage treatment plant shall be renewed every year. All the provisions under the Water (Prevention and Control of Pollution) Act, 1974 is also applicable to be Occupier of Local Body.

Water Cess Act:

Local bodies shall furnish the quantity of water supplied to the community/public in the prescribed form, (WATER CESS RETURN) every month to the Karnataka State Pollution Control Board under the provisions of Water (Prevention and Control Pollution) Cess Act, 1977

2.3. AIR (PREVENTION AND CONTROL OF POLLUTION) ACT, 1981

Objective:

The Air (Prevention and Control of Pollution) Act, 1981, is an Act to provide for the prevention, control & abatement of air pollution (entire Karnataka is declared as air pollution control area).

Emission of solid or liquid or gaseous substances (including noise) are covered under this statute. No person, shall establish or operate any industrial plant in any air pollution control area, shall discharge or cause or permit to be discharged the emission of any air pollutant in excess of the standards laid down by the State Board. These emissions shall be with prior consent of the State Board.

Salient features:

- New industry shall obtain the consent for establishment of the Board to establish an industrial plant.
- New industries prior to commissioning and existing industries shall obtain consent of the State Board for discharge of emissions into atmosphere.
- For remedial measures, the Act provides for issue of directions by the Board to any industry for its closure, prohibition or regulation or regulation of any operation or process or the stoppage or regulation of supply of electricity, water or any other service.
- Any contravention of the provisions of the statute will attract penal action, which include fine & imprisonment.

Important Definitions

(Section 2):

(a) **"air pollutant"** means, any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment;

(b) **"air pollution"** means, the presence in the atmosphere of any air pollutant;

(c) **"approved appliances"** means, any equipment or gadget used for the bringing of any combustible material or for generating or consuming any fume, gas of particulate matter and approved by the State Board for the purpose of this Act;

(d) **"chimney"** includes any structure with an opening or outlet from or through which any air pollutant may be emitted;

(e) **"control equipment"** means, any apparatus, device, equipment or system to control the quality and manner of emission of any air pollutant and includes any device used for securing the efficient operation of any industrial plant;

(f) **"emission"** means, any solid or liquid or gaseous substance (including noise) coming out of any chimney, duct or flue or any other outlet;

(g) **"industrial plant"** means, any plant used for any industrial or trade purposes and emitting any air pollutant into the atmosphere;

(h) **"occupier"** in relation to any factory or premises means, the person who has control over the affairs of the factory or the premises, and includes, in relation to any substance, the person in possession of the substance:

Air Pollution Control Area

(Section 19):

Entire State of Karnataka is declared as air pollution control area vide Notification No.DEE 5 ECO 87 dated 30-5-1988.

Power to give instructions for ensuring standards for emission from automobiles

(Section 20):

With a view to ensuring that the standards for emission of air pollutants from automobiles laid down by the State Board under Clause (g) of sub-section (1) of Section 17 are complied with, the State Government shall, in consultation with the State Board, give such instructions as may be deemed necessary to the concerned authority in charge of registration of motor vehicles under the Motor Vehicles Act, 1939 (Act 4 of 1939), and such authority shall, notwithstanding anything contained in that Act or the rules made thereunder be bound to comply with such instructions.

Restriction on use of certain Industrial Plants

(Section 21):

1. Subject to the provisions of this section, no person shall, without the previous consent of the State Board, establish or operate any industrial plant in an air pollution control area:

2. An application for consent of the State Board under sub-section (1) shall be accompanied by such fees as may be prescribed and shall be made in the prescribed form and shall contain the particulars of the industrial plant and such other particulars as may be prescribed:

3. The State Board may make such inquiry as it may deem fit in respect of the application for consent referred to in sub-section (1) and in making any such inquiry, shall follow such procedure as may be prescribed.

4. Within a period of four months after the receipt of the application for consent referred to in sub-section (1), the State Board shall, by order in writing, and for reasons to be recorded in the order, grant the consent applied for, subject to such conditions and for such period as may be specified in the order, or refuse consent:

   Provided that it shall be open to the State Board to cancel such consent before the expiry of the period for which it is granted or refuse further consent after such expiry if the conditions subject to which such consent has been granted are not fulfilled:

   Provided further that before cancelling a consent or refusing a further consent under the first provision, a reasonable opportunity of being heard shall be given to the person concerned.

5. Every person to whom consent has been granted by the State Board under sub-section (4), shall comply with the following conditions, namely:-

   (i) the control equipment of such specifications as the State Board may approve in this behalf shall be installed and operated in the premises where the industry is carried on or proposed to be carried on;

   (ii) the existing control equipment, if any, shall be altered or replaced in accordance with the directions of the State Board;

   (iii) the control equipment referred to in clause (i) or clause (ii) shall be kept at all times in good running condition;

(iv) chimney, wherever necessary, of such specifications as the State Board may approve in this behalf shall be erected or re-erected in such premises;

(v) such other conditions as the State Board, may specify in this behalf; and

(vi) the conditions referred to in clauses (i), (ii) and (iv) shall be complied with, within such period as the State Board may specify in this behalf:

Provided that in the case of a person operating any industrial plant in an air pollution control area immediately before the date of declaration of such area as an air pollution control area, the period so specified shall not be less than six months:

Provided further that -

(a) after the installation of any control equipment in accordance with the specifications under clause (i), or

(b) after the alteration or replacement of any control equipment in accordance with the directions of the State Board under clause (ii), or

(c) after the erection or re-erection of any chimney under clause (iv), no control equipment or chimney shall be altered or replaced, or as the case may be erected or re-erected except with the previous approval of the State Board.

6. If due to any technological improvement or otherwise the State Board is of opinion that all or any of the conditions referred to in sub-section (5) require or requires variation (including the change of any control equipment, either in whole or in part), the State Board shall, after giving the person to whom consent has been granted an opportunity of being heard, vary all or any of such conditions and thereupon such person shall be bound to comply with the conditions as so varied.

7. Where a person to whom consent has been granted by the State Board under subsection (4) transfers his interest in the industry to any other person, such consent shall be deemed to have been granted to such other person and he shall be bound to comply with all the conditions subject to which it was granted as if the consent was granted to him originally.

Compliance to emission norms

(Section 22):

No person operating any industrial plant, in any air pollution control area shall discharge or cause or permit to be discharged the emission of any air pollution in excess of the standards laid down by the State Board under Clause (g) of sub-section (1) of Section 17.

Power of the Board to make application to Court

(Section 22 A):

1. Where it is apprehended by a Board that emission of any air pollutant, in excess of the standards laid down by the State Board under clause (g) of sub-section (1) of Section 17, is likely to occur by reason of any person operating an industrial plant or otherwise in any air pollution control area, the Board may make an application to a court, not inferior to that of a Metropolitan Magistrate or a Judicial Magistrate of the first class for restraining such person from emitting such air pollutant.

2. On receipt of the application under sub-section (1), the court may make such order, as it deems fit.

3. Where under sub-section (2), the court makes an order restraining any person from discharging or causing or permitting to be discharged the emission of any air pollutant, it may, in that order,-

(a) direct such person to desist from taking such action as is likely to cause emission;

(b) authorize the Board, if the direction under clause (a) is not complied with by the person to whom such direction is issued, to implement the direction in such manner as may be specified by the court.

4. All expenses incurred by the Board in implementing the directions of the court under Clause (b) of sub-section (3) shall be recoverable from the person concerned as arrears of land revenue or of public demand.

Furnishing information on emission in excess of standard

(Section 23):

Require the industries to furnish information on the emission in excess of the standards laid down or is apprehended to occur shall intimate the fact of occurrence to the Board, to the Deputy Commissioner of the District, the Revenue Divisional Officer, the Executive Authority of the Local Body and the nearest Police Station.

The expenses met towards the remedial measures taken by the agencies & the Board to mitigate the pollution shall be recovered by from the polluter.

Power to inspect

(Section 24):

Empowers the Board Officials to inspect the industry for examining and testing control equipment, industrial plant, record, register, documents or etc., and also to seize such control equipments, industrial plant, record, register, etc., as an evidence of offence has been or is being or is about to be committed, to be produced in the court of law.

Collection of information

(Section 25) :

Empowers the Board to obtain information.

Power to take samples for analysis

(Section 26):

1. A State Board or any officer empowered by it in this behalf shall have power to take, for the purpose of analysis, samples of air or emission from any chimney, flue or duct or any other outlet in such manner as may be prescribed.

2. The result of any analysis of a sample of emission taken under sub-section (1) shall not be admissible in evidence in any legal proceeding unless the provisions of sub-section (3) and (4) are complied with.

3. Subject to the provisions of sub-section (4), when a sample of emission is taken for analysis under sub-section (1), the person taking the sample shall-

   (a) serve on the occupier or his agent, a notice, then and there, in such form as may be prescribed, of his intention to have it so analysed;

   (b) in the presence of the occupier or his agent, collect a sample of emission for analysis;

   (c) cause the sample to be placed in a container or containers which shall be marked and sealed and shall also be signed both by the person taking the sample and the occupier or his agent;

   (d) send, without delay, the container to the laboratory established or recognized by the State Board under Section 17, or, if a request in that behalf is made by the occupier or his agent when the

notice is served on him under clause (a), to the laboratory established or specified under sub-section (1) of Section 28.

4. When a sample of emission is taken for analysis under sub-section (1) and the person taking the sample serves on the occupier or his agent, a notice under clause (a) of subsection (3), then,-

   (a) in a case where the occupier or his agent willfully absents himself, the person taking the sample shall collect the sample of emission for analysis to be placed in a container or containers which shall be marked and sealed and shall also be signed by the person taking the sample, and

   (b) in a case where the occupier or his agent is present at the time of taking the sample but refuses to sign the marked and sealed container or containers of the sample of emission as required under clause (c) of sub-section (3), the marked and sealed container or containers shall be signed by the person taking the sample, and the container or containers shall be sent without delay by the person taking the sample for analysis to the laboratory established or specified under sub-section (1) of Section 28 and such person shall inform the Government Analyst appointed under subsection (1) of Section 29, in writing, about the willful absence of the occupier or his agent, or, as the case may be, his refusal to sign the container or containers.

Appeals

(Section 31):

Provides for appeal against the orders of the State Board to the Appellate Authority at The Appellate Authority, 6th Floor, P.U.Building, M.G.Road, Bangalore-1 within 30 days of the communication of the order.

Powers to give direction

(Section 31 A):

Notwithstanding anything contained in any other law, but subject to the provisions of this Act, and to any directions that the Central Government may give in this behalf, a Board may, in the exercise of its powers and performance of its functions under this Act, issue any directions in writing to any person, officer or authority, and such person, officer or authority shall be bound to comply with such directions.

Explanation -For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct-

(a) the closure, prohibition or regulation of any industry, operation or process, or

(b) the stoppage or regulation of supply of electricity, water or any other service.

Penalties

(Section 37):

1. Whoever fails to comply with the provisions of Section 21 of Section 22 or directions issued under Section 31A, shall, in respect of each such failure, be punishable with imprisonment for a term which shall not be less than one year and six months but which may extend to six years and with fine, and in case the failure continues, with an additional fine which may extend to five thousand rupees for every day during which such failure continues after the conviction for the first such failure.

2. If the failure referred to in sub-section (1) continues beyond a period of one year after the date of conviction, the offender shall be punishable with imprisonment for a term which shall not be less than two years but which may extend to seven years and with fine.

Penalty for contravention of certain provisions of the Act

(Section 39):

Whoever contravenes any of the provisions of this Act or any order or direction issued thereunder, for which no penalty has been elsewhere provided in this Act, shall be punishable with imprisonment for a term which may extend to three months or with fine which may extend to then thousand rupees or with both, and in the case of continuing contravention, with an additional fine which may extend to five thousand rupees for every day during which such contravention continues after conviction for the first such contravention.

Bar of jurisdiction

(Section 46):

No Civil Court shall have jurisdiction to entertain any suit or proceeding in respect of any matter, which an Appellate Authority constituted under this Act, is empowered by or under this act to determine.

Responsibilities of Occupier.

- Obtain "Consent to Establish" prior to establishing any industrial plant in an air pollution control area, which is likely to emit air pollutant (s).
- Obtain "Consent to Operate" prior to commencing operation of any industrial plant, which is likely to emit air pollutant (s) in an air pollution control area.
- Apply for the renewal of "Consent to Operate" before expiry of the validity period, as specified in the consent granted earlier, in the prescribed form, along with the prescribed fees.
- To comply with emission norms and direction and conditions of consent.
- To report any discharge of emissions exceeding the norms.

2.4 ENVIRONMENT (PROTECTION) ACT, 1986.

Objective:

Environment (Protection) Act, 1986, confers powers to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution. Environment includes water, air, land and the inter-relationship which exists among and between water, air, land and human beings, other living creatures, plants, micro-organisms and property. This Act imposes a duty on every person to take steps to prevent or mitigate the environmental pollution.

Salient features:

1. The Act empowers Central Government to make specific Rules for protection of environment.
2. It is a general legislation for environmental protection focusing on specific types of pollution like Hazardous substance, Bio-medical Waste, Municipal Solid Waste etc.
3. Coordination activities of various regulating agencies.
4. Industry specific standards, equipment based standards and general standards are laid down for regulation of discharge of environmental pollutants under this Act.

Important Definitions

(Section 2):

(a) **"Environment"** includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property;

(b) **"Environmental Pollutant"** means, any solid, liquid or gaseous substance present in such concentration as may be, or tend to be injurious to environment;

(c) **"Environmental Pollution"** means, the presence in the environment of any environmental pollutant;

(d) **"Handling"** in relation to any substance, means the manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion, offering for sale, transfer or the like of such substance;

(e) **"Hazardous substance"** means, any substance or preparation which, by reason of its chemical or physico-chemical properties or handling, is liable to cause harm to human beings, other living creatures, plant, micro-organism, property or the environment;

(f) **"Occupier"** in relation to any factory or premises means, the person who has control over the affairs of the factory or the premises and includes in relation to any substance, the person in possession of the substance.

Power of the Central Government to take measures to protect and improve environment

(Section 3):

(1) subject to the provisions of this Act, the Central Government shall have the power to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution.

(2) coordination of actions by State Governments.

(3) laying down standards for effluents emission from different source.

(4) restriction of areas for industrial activities.

(5) laying down procedure for safeguards.

(6) carrying out and sponsoring investigations.

(7) establishment and recognition of environmental laboratories.

Power to give Directions

(Section 5):

Notwithstanding anything contained in any other law but subject to the provisions of this Act, the Central Government may, in the exercise of its powers and performance of its functions under this Act, issue directions in writing to any person, officer or any authority and such person, officer or authority shall be bound to comply with such directions.

Explanation- For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct -

(a) the closure, prohibition or regulation of any industry, operation or process; or

(b) stoppage or regulation of the supply of electricity or water or any other service.

Note: Under this Section, Chairman, KSPCB is empowered to issue orders for regulation of industry, operation or process or closure of industry, stoppage of electricity and water supply or any other service for violation of Hazardous Waste Management Rules, Plastic Rules & Bio-medical Waste Rules..

Rules to regulate environmental pollution

(Section 6):

1. The Central Government may, by notification in the Official Gazette, make rules in respet of all or any of the matters referred to in Section 3.
2. In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:-
   (a) the standards of quality of air, water or soil for various areas and purposes;
   (b) the maximum allowable limits of; concentration of various environmental pollutants (including noise) for different areas;
   (c) the procedures and safeguards for the handling of hazardous substances;
   (d) the prohibition and restrictions on the handling of hazardous substances in different areas;
   (e) the prohibition and restriction on the location of industries and the carrying on process and operations in different areas;
   (f) the procedures and safeguards for the prevention of accidents which may cause environmental pollution and for providing for remedial measures for such accidents.

Compliance to standards

(Section 7):

Requires that the persons carrying on industry operation, etc., not to allow emission or discharge of environmental pollutants in excess of the standards prescribed.

Furnishing information to Authorities

(Section 9):

Requires that the person responsible have to furnish information to concerned authorities and agencies in case of discharge of any environmental pollution in excess of the prescribed standard occurs or is apprehended to occur due to any accident or natural or unforeseen act etc.

Empower the Authority or Agency to take remedial measures to prevent or mitigate the environmental pollution and expenses incurred during such measures shall be recovered from the polluter.

Power of entry & inspection

(Section 10):

Empower the concerned officers to make inspection of the industry etc. for the purpose of examining and testing industrial plant, record, register, etc for seizing any such equipments, industrial plant, etc to prevent or mitigate environmental pollution.

Power to take samples and procedure of sampling

(Section 11):

1. The Central Government or any officer empowered by it in this behalf, shall have power to take, for the purpose of analysis, samples or air, water, soil or other substance from any factory, premises or other place prescribed.
2. Subject to the provisions the person taking the sample
   (a) serve on the occupier or his agent or person in charge of the place, a notice, then and there, in the prescribed form, of his intention to have it so analysed;
   (b) in the presence of the occupier or his agent or person, collect a sample for analysis;
   (c) the sample collected to be placed in a container or containers which shall be marked and sealed and shall also be signed both by the person taking the sample and the occupier or his agent or person;
   (d) send, without delay, the container or the containers to the laboratory established or recognized by the Central Government.
3. When a sample is taken for analysis the person taking the sample serves on the occupier or his agent or person, a notice under the provisions of this Act.
   (a) in a case where the occupier or his agent or person will fully absents himself, the person taking the sample shall collect the sample for analysis to be placed in a container or containers which shall be marked and sealed and shall also be signed by the person taking the sample, and
   (b) in a case where the occupier or his agent or person present at the time of taking the sample refuses to sign the marked and sealed container or containers of the sample as required the marked and sealed container or containers shall be signed by the person taking the samples, and the container or containers shall be sent without delay by the person taking the sample for analysis to the laboratory established or recognized and such person shall inform the Government Analyst appointed in writing, about the willful absence of the occupier or his agent or person, or, as the case may be, his refusal to sign the container or containers.

Environmental laboratory

(Section 12):

(1) The Central Government may, by notification in the Official Gazette.-

(a) establish one or more environmental laboratories;

(b) recognize one are more laboratories or institutes as environmental laboratories to carry out the functions entrusted to an environmental laboratory under this Act.

Penalty for contravention of the provisions of the Act

1. Whoever fails to comply with or contravenes any of the provisions of this Act, or the rules made or orders or directions issued thereunder, shall, in respect of each such failure or contravention, be punishable with imprisonment for a term which may extend to five years with fine which may extend to one lakh rupees, or with both, and in case the failure or contravention continues, with additional fine which may extend to five thousand rupees for every day during which such failure or contravention continues after the conviction for the first such failure or contravention.

2. If the failure or contravention referred to in sub-section (1) continues beyond a period of one year after the date of conviction, the offender shall be punishable with imprisonment for a term, which may extend to seven years.

Cognizance of offence

(Section 19):

No court shall take cognizance of any offence under this Act except on a complaint made by-

(a) the Central Government or any authority or officer authorized in this behalf by that Government, or

(b) any person who has given notice of not less than sixty days, in the manner prescribed, of the alleged offence and of his intention to make a complaint, to the Central Government or the authority or officer authorized as aforesaid.

Bar of jurisdiction

(Section 22):

No civil court shall have jurisdiction to entertain any suit or proceeding in respect of anything done, action taken or order or direction issued by the Central Government or any other authority or officer in pursuance of any power conferred by or in relation to its or his functions under this Act.

2.5 THE PUBLIC LIABILITY INSURANCE ACT, 1991

This Act, unique to India, imposes on the owner the liability to provide immediate relief in respect of death or injury to any person or damage to any property resulting from an accident while handling any of the notified hazardous chemicals. This relief has to be provided on "no fault" basis. To be able to meet his liability, the owner handling hazardous chemicals has to take an insurance policy of an amount equal to it's "paid up capital" or upto Rs.500 millions, whichever is less. The policy has to be renewed every year. New undertakings will have to take this policy before starting their activity. The owner also has to pay an amount equal to it's annual premium to the Central Government's Environment Relief Fund (ERF). The reimbursement of relief to the extent of Rs.25,000/- per person is admissible in case of fatal accidents in addition to the reimbursement of medical expenses upto Rs.12,500/-. The liability of the insurer is limited to Rs.50 million per accident upto Rs.150 millions per year or upto the tenure of the policy. Any claims in excess to this liability will be paid from the ERF. In case the award still exceeds, the remaining amount shall have to be met by the owner. The payment under the Act is only for the immediate relief; owner shall have to provide final compensation, if any, arising out of legal proceedings.

Obligations of owners of an industry:

- to provide relief, as specified, in case of death of injury to any person (other than workman); or damage to property from an accident occurring while handling specified hazardous substances, on the principle of no fault.
- to draw insurance policies more than the paid-up capital of the undertaking, but less than Rs.50 Crores, before handling any hazardous substances.
- "Paid-up Capital" implies the market value of all assets and stocks of the undertaking on the date of insurance.
- to pay additional amounts, as prescribed, to the insurer not exceeding the amount of premium, as contribution to the Environmental Relief fund established under the Act.
- to provide any information required by the Central Government or agencies authorized by it, for ascertaining compliance with the provisions of the Act.
- to allow entry and inspection of any person empowered by the Central Government to the place where the industrial activity involving hazardous chemicals is being carried out at all reasonable times, to ascertain compliance with the provisions of the Act.
- to pay the amount of an award as specified by the Collector in the prescribed manner.

Rights of owner

- Opportunity of hearing by the District Collector, before awarding the amount of relief.
- Opportunity to file objections with the Central Government against the proposed directions in the specified form within the specified time (15 days from the date of service of the notice);

2.6. THE NATIONAL ENVIRONMENT TRIBUNAL ACT, 1995

Objectives:

To provide for strict civil liability for damages arising out of any accident occurring while handling any hazardous substance and for establishment of a National Environment Tribunal for expeditious disposal of cases arising from such accident and for granting relief and compensation for damage to persons property and to environment.

Salient features:

- Liability to pay compensation on the principle of no fault. On the death of, or injury to any person (other than a workman) or damage to any property or environment on account of an accident, the owner shall be liable to pay for such death, injury or damage.
- Claimant is not required to establish or plead the cause of accident.
- An application for claiming compensation can be made by the person sustaining the injury, by the owner of the property to which damage had been caused, by all or any of the legal representatives of the deceased (where death has been caused), by any agent duly authorized by such person or owner of the property or all or any of the legal representatives of the deceased, by any representative body or organization functioning in the filed of environment and recognized by the Central Government and the Central Government or a State Government or a local authority.
- The tribunal may if it thinks fit take up cases for claims for compensations Suo Moto (on its own).
- A claimant making an application may also make an application before the Tribunal for immediate relief provided under the Public Liability Insurance Act, 1991, provided that no such relief has been received and no application made by the claimant to the collector under the said Act is pending.
- As application for compensation shall not be entertained unless it is made within five years of the occurrence of the accident.
- The owner who is to pay compensation under this Act on account of death caused or injury to any person or damage to any property and who is also liable to pay any amount as relief under the Public Liability Insurance Act, 1991, or any other compensation under any other law, shall deduct from the amount of compensation, the amount of relief or other compensation paid under any other law.
- Notwithstanding that there shall be no appeal against an award or other order made by the Tribunal with the consent of parties and not withstanding the provisions of the Code of Civil Procedure, 1908, an appeal shall lie against any award or other order (except an interlocutory order) of the Tribunal.
- Central Government shall establish a National Environment Tribunal for effective and expeditious disposal of compensation cases.
- The Tribunal consists of a Chairperson and number of Vice-Chairpersons, Judicial Members and Technical Members, The term of office is five years and President is an Appellate Authority.
- The Head Quarters of the Tribunal is at Delhi.

- Whoever fails to comply with an order made by the Tribunal shall be punishable with imprisonment for a term which may extend to three years, or with fine which may extend to ten lakh rupees, or with both.
- An appeal against the orders of the Tribunal shall be made to the Supreme Court on one or more of the grounds within 90 days of the date of award. No appeal shall be entertained by a person who is required to pay a compensation on terms of such awards to the Supreme Court unless he deposits the amount so awarded.
- No court or other authority except the Tribunal shall have, or be entitled to exercise, any jurisdictional powers or authority to entertain any application or action which may be entertained or dealt with by the Tribunal.

Note: The provisions of the Act will come into force on the date of notified by the Central Government for implementation.

2.7 THE NATIONAL ENVIRONMENT APPELLATE AUTHORITY ACT

Objectives:

An Act to provide for the establishment of a National Environment Appellate Authority to hear appeals with respect to restriction of areas in which any industries, operations or processes or class of industries, operations or process shall not be carried out or shall be carried out subject to certain safeguards under the Environment (Protection) Act, 1986, and for matters connected therewith or incidental thereto

Appeals to Authority:

1. Any person aggrieved by an order granting environmental clearance in the areas in which any industries, operations or processes or class of industries, operations and processes shall not be carried out or shall be carried out subject to certain safeguards may, within thirty days from the date of such order, prefer an appeal to the Authority in the prescribed form.

   Provided that the Authority may entertain any appeal after the expiry of the said period of thirty days, but not after ninety days from the date of aforesaid if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

2. For purposes of sub-section (1), "person" means-

   (a) any person who is likely to be affected by the grant of environmental clearance;

   (b) any person who owns or has control over the project with respect to which an application has been submitted for environmental clearance;

   (c) any association of person (whether incorporated or not) likely to be affected by such order and functioning in the field of environment;

   (d) the Central Government, where the environmental clearance is granted by the State Government and the State Government, where the environmental clearance is granted by the Central Government; or

   (e) any local authority, any part of whose local limits is within the neighbourhood of the area wherein the project is proposed to be located.

3. On receipt of an appeal the Authority shall, after giving the appellant an opportunity of being heard, pass such orders, as it thinks fit.

4. The authority shall dispose of the appeal within ninety days from the date of filing the appeal.

   Provided that the Authority may for reasons to be recorded in writing, dispose of the appeal within a further period of thirty days.

Bar of jurisdiction:

With effect from the date of establishment of the Authority, no civil court or other authority shall have jurisdiction to entertain any appeal in respect of any matter with which the Authority is empowered by or under this Act.

Penalty for failure to comply with orders of Authority:

Whoever fails to comply with any order made by the Authority, he shall be punishable with imprisonment for a term which may extend to seven years, or with fine which may extend to one lakh rupees, or with both.

Head Quarters of the Authority:

Head Quarters of the Authority is at Jawaharlal Nehru Stadium, Gate No.31, 1st Floor, Lodhi Road, New Delhi-110003.

Form of memorandum of appeal and its presentation before the Authority:

1. Memorandum of appeal to be presented to the Authority shall be in Form-A and shall contain the particulars required thereunder. The Memorandum of Appeal shall be in English or in Hindi and shall set forth concisely and under distinct heads, the grounds of appeal without any argument or narrative and such ground shall be numbered consecutively.
2. Every Memorandum of appeal shall be presented by the appellant in person, or when there are more appellants than one, by any of them, or by his authorised representative before the Registrar or any other officer authorised in this behalf by the Chairman or may be sent by registered post with acknowledgment due addressed to the Registrar.
3. Where Memorandum of Appeal is sent by registered post, the date of the said memorandum at the Head Office, as endorsed by either of them, shall be taken as the date of filing of the appeal by the appellant.
4. Where there is a delay in the presentation of the memorandum of appeal before the Authority, such memorandum of appeal shall be accompanied by a separate application for condonation of delay and the supporting affidavit of such application.
5. Every memorandum of appeal and the attested copy of the order appealed against and the application for condonation of delay and the supporting affidavit to be filed before the Authority shall be accompanied by five sets of their copies for the authority and one set of copies for each of the Respondents.
6. In every appeal, the competent authority which passed the order appealed against, shall be impleaded as one of the respondents.

3. RULES & NOTIFICATIONS - SALIENT FEATURES

3.1 RULES NOTIFIED BY GOVERNMENT OF INDIA

3.1.1 ENVIRONMENT (PROTECTION) RULES, 1986.

Important Definitions

(Rule 2):

(a) **"Areas"** means, all areas where the hazardous substances are handled;

(b) **"Prohibited Substance"** means, the substance prohibited for handling.

(c) **"Recipient System"** means, the part of the environment such as soil, water, air or other which receives the pollutants;

(d) **"Restricted Substance"** means, the substance restricted for handling;

(e) **"Section"** means, a section of the Act;

(f) **"Standards"** means, standards prescribed under these rules;

Standards for emission and discharge of environmental pollutants:

(Rule 3):

1. Standards for emission and for discharge of pollutants from the industries operations or procedures are specified in Schedule as under-

Industries specific standard for effluent and emission.	- Schedule-I
Ambient air quality standards in respect of noise.	- Schedule-III
Standards for smoke, vapour from motor vehicle.	- Schedule-IV
General standard for discharge of effluent.	- Schedule-VI

2. Empowers the Central Board or State Board to specify most stringent standards for the relevant parameters with respect and specific industries or location after recording reasons.

Prohibition and restriction on the location of industries

(Rule 5):

Lays down procedure to be followed for prohibition and restriction on the location of industries and carrying on of processes and operations in different areas.

Sample collection

(Rule 6):

The Central Government or the officer empowered to take samples under the Environment (Protection) Act shall collect the sample in sufficient quantity to be divided into two uniform parts and effectively seal and suitably mark the same and permit the person from whom the sample is taken to add his own seal or mark to all or any of the portions so sealed and marked.

In case where the sample is made up in containers or small volumes and is likely to deteriorate or be otherwise damaged if exposed, the Central Government or the officer empowered shall take two of the said samples without opening the containers and suitably seal and mark the same. The Central Government or the officer empowered shall dispose of the samples so collected as follows:-

(i) one portion shall be handed over to the person from whom the sample is taken or his acknowledgement;

(ii) the other portion shall be sent forthwith to the environmental laboratory or analysis.

Environment Statement

(Rule 14):

Every person carrying on an industry, operation or process requiring consent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 or under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 or both or authorization under the Hazardous Wastes (Management & Handling) Rules, 1989, issued under the Environment (Protection) Act, 1986 shall submit an Environmental Statement Report for the financial year ending the 31st March in Form-V to the concerned State Pollution Control Board on or before the 15th day of September every year.

3.1.2 HAZARDOUS WASTES (MANAGEMENT & HANDLING) RULES, 1989,

(as amended on 6-1-2000 and 23-5-2003).

These rules are applicable for hazardous waste specified in Schedule and do not apply to wastewater and air emissions covered under Air & Water Acts, Bio medical Waste (Management and Handling) Rules, Municipal Solid Wastes (Management & Handling) Rules and Batteries (Management and Handling) Rules.

Important Definitions:

(1) **"Authorisation"** means permission for collection, transport, treatment, reception, storage and disposal of Hazardous Waste.

(2) **"Disposal"** means deposit, treatment, recycling and recovery of any Hazardous Waste.

(3) **"Treatment"** means a method, technique or process, designed to change the physical, chemical or biological characteristics or composition of any hazardous waste so as to render such wastes harmless.

(4) **"Hazardous Waste"** means, any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics listed in the Schedule of this Rules.

(5) **"Used oil"** means any oil-

  (i) derived from crude oil or mixtures containing synthetic oil including used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil, spent oil and their tank bottom sludges; and

  (ii) suitable for re-refining if it meets the specifications laid down in Schedule 5, but does not include waste oil;

(6) **"Waste oil"** means any oil

  (i) which includes spills of crude oil, emulsions, tank bottom sludge and slop oil generated from pertroleum refineries, installations or ships; and

  (ii) is unsuitable for re-refining, but can be used as fuel in furnaces if it meets the specifications laid down in Schedule 6;

Responsibilities and duties of occupier or operator of hazardous waste facility

(Rule 4) :

(1) The Occupier and the Operator of a facility shall be responsible for proper collection, reception, treatment, storage and disposal of hazardous waste listed in Schedules.

(2) It shall be the responsibility of the Occupier and the Operator of a facility to take all steps to ensure that the wastes listed in Schedules are properly handled and disposed off as may be specified by State Board without any adverse effect to the environment.

(3) The Operator of a facility to take adequate steps while handling hazardous waste to:

  (i) contain contaminants & prevent accident and limit their consequences on human and the environment, and

  (ii) provide persons working on the site with information, training and equipment necessary to ensure their safety.

Grant of Authorization

(Rule 5):

Every Occupier generating hazardous waste and having a facility for collection, reception, treatment, transport, storage and disposal of such wastes shall make an application in Form-I to the State Pollution Control Board for the grant of authorization for any of the above activities.

The State Pollution Control Board shall process the authorization application within 90 days and grant or refuse the authorization. Before expiry of the authorization on submission of application for renewal of authorization by the occupier or operator the facility, the Member Secretary of the Board after examining the fulfillment of conditions prescribed in the previous authorization will take decision on renewal of authorization application.

Suspend or Cancel the Authorisation

(Rule 6):

The authority empowered to grant authorization can suspend the same if it thinks fit, if in its opinion, the authorized person has failed to comply with the conditions of authorization or with any provisions of the Act or Rules by giving an opportunity to Show-cause and after recording the reasons thereof shall cancel/ suspend the authorization.

Packaging, labeling and transport of Hazardous Waste

(Rule 7):

(1) The occupier or operator of a facility shall ensure that the hazardous wastes are packaged, based on the composition in a manner suitable for handling, storage and transport and the labeling and packaging shall be easily visible and be able to withstand physical conditions and climatic factors.

(2) Packaging, labeling and transport of hazardous wastes shall be in accordance with the provisions of the rules made by the Central Government under the Motor Vehicles Act, 1988, and other guidelines issued from time to time.

(3) All hazardous waste containers shall be provided with a general label as given in Form 8.

(4) The occupier shall prepare six copies of the manifest in Form 9 comprising of colour code indicated below:

Copy number with colour code	Purpose
Copy 1 (white)	forwarded to State Pollution Control Board.
Copy 2 (yellow)	after signature by transporter to be retained by the occupier.
Copy 3 (pink)	retained by the operator of a facility
Copy 4 (orange)	Returned to the transporter by the operator of facility after accepting waste.
Copy 5 (green)	Forwarded to Pollution Control Board by the operator of the facility after disposal of waste.
Copy 6 (blue)	Returned to the occupier by the operator of the facility after disposal of waste.

(5) The occupier shall forward copy number 1(white) to the State Pollution Control Board and in case the hazardous waste is likely to be transported through any transit State, the occupier shall prepare an additional copy each for such State and forward the same to the concerned State Pollution Control Board before he hands over the hazardous waste to the transporter. No transporter shall accept hazardous wastes from an occupier for transport unless it is accompanied by copy numbers 2 to 5 of the manifest. The transporter shall return copy number 2 (yellow) of the manifest signed with date to the occupier as token of receipt of the other four copies of the manifest and retain the remaining four copies to be carried and handed over to respective agencies as specified in sub-rule (4).

(6) In case of transport of hazardous wastes to a facility for treatment, storage and disposal existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board of the concerned State or Union territory Administration where the facility is existing.

(7) The occupier shall provide the transporter with relevant information in Form 10, regarding the hazardous nature of the wastes and measures to be taken in case of an emergency.

Disposal sites

(Rule 8):

(1) The occupier or any operator of facility or any association of occupiers is jointly and severally responsible for identifying sites for establishing a facility for Treatment Storage & Disposal (TS&D) of Hazardous Waste.

(2) The State Government, operator of a facility or any association of occupiers shall jointly and severally be responsible for, and identifying sites for common facility for TS&D of Hazardous Waste in State.

(3) Environmental Impact Assessment to be conducted for identified site.

(4) Public hearing is to be conducted by the State Pollution Control Board as per EIA Notification.

(5) State Pollution Control Board shall forward to State Government project report, EIA and details of public hearing within 30 days of hearing.

(6) State Government shall assess and convey the decision of its approval or otherwise within 30 days.

(7) After approval of the site the State Government shall acquire the site or permit the occupier of the facility to acquire the site. Simultaneously the State Government will notify such sites.

(8) Setting up of a on-site facility for TS&D of Hazardous Waste for captive area shall be governed by the authorization.

Design and setting up of disposal facility

(Rule 8A)

a) Design and setting up of facility shall be as per the guidelines issued by Central Government or State Government.

b) Design shall be got approved by State Pollution Control Board

Operation and closure of landfill site

(Rule 8(B))

1. The occupier or the operator as the case may be, shall be responsible for safe and environmentally sound operation of the facility as per design approved by the State Pollution Control Board.

2. The occupier or the operator shall ensure that the closure of the landfill is as per the design approved by the State Pollution Control Board.

Records and returns

(Rule 9):

1. The occupier generating hazardous waste and operator of a facility for collection, reception, treatment, transport, storage and disposal of hazardous waste shall maintain records of such operations in Form3.

2. The occupier and operator of a facility shall send annual returns to the State Pollution Control Board in Form-4

3. The State Pollution Control Board shall prepare an inventory of hazardous wastes as nearly as possible in Form 4 within its jurisdiction and compile other related information like treatment and disposal of hazardous wastes based on the returns filed by respective occupier and operator of facility.

Accident reporting and follow-up

(Rule 10):

Where an accident occurs at the facility or on a hazardous waste site or during transportation of hazardous waste, the occupier or operator of a facility shall report immediately to the State Pollution Control Board about the accident in Form-V.

Import and Export of Hazardous Wastes for dumping and disposal

(Rule 11):

Import of hazardous wastes from any country to India and export of hazardous wastes from India to any country for dumping or disposal shall not be permitted.

Import and Export of Hazardous Wastes for recycling and reuse

(Rule 12):

1. No person shall import or export hazardous waste or substances containing or contaminated with such Hazardous Waste as specified in Schedule
2. Import and export of hazardous wastes shall be permitted as raw material for recycling or reuse.
3. The Ministry of Environment and Forests shall be the nodal Ministry to deal with transboundary movement of hazardous waste & to grant permission.
4. Any occupier importing or exporting hazardous waste shall provide detailed information in Form-7A to the Customs authorities.
5. Any occupier exporting or importing hazardous waste from or to India shall comply with the articles of the Basel Convention to which the Central Government is a signatory.

Import of Hazardous Waste

(Rule 13):

1. Every occupier importing hazardous waste shall apply to the State Pollution Control Board, atleast one hundred twenty days in advance of intended date of commencement of shipment in Form-VI for permission to import.
2. The State Pollution Control Board shall examine the application received from the occupier within thirty days and forward the application with recommendation and requisite stipulations for safe transport, storage and processing, to the Ministry of Environment and Forests.
3. The Ministry of Environment and Forests, Government of India, will examine the application received from the State Pollution Control Board and after satisfying itself will grant permission for imports subject to the following:

   (a) environmentally friendly/appropriate technology used for re-processing.

   (b) the capability of the importer to handle and reprocess hazardous wastes in an environmentally sound manner;

(c) presence of adequate facility for treatment and disposal of wastes generated; and

(d) approvals, no objection certificates and authorizations from all concerned authorities; and

4. The Ministry of Environment & Forests, Government of India, shall forward a copy of the permission granted, to the Central Pollution Control Board, the State Pollution Control Board and the concerned Port and customs authorities for ensuring compliance of the conditions of imports and to take appropriate steps for safe handling of the waste at the time of off-loading.

5. An application for licence to the Directorate General of Foreign Trade for import shall be accompanied with the permission granted by the Ministry of Environment & Forests, Government of India, to the importer and an authenticated copy of Form-VII of the Exporter.

6. The Port and Custom authorities shall ensure that the shipping document is accompanied with an authenticated copy of Form-VII and the test report from an accredited laboratory of analysis of the hazardous waste shipped.

7. The occupier having valid permission to import shall inform the State and Central Pollution Control Board and the Port authorities of the arrival of the consignment of hazardous wastes ten days in advance.

8. The occupier importing hazardous waste shall maintain the records of hazardous waste imports as specified in Form-6A and the record so maintained shall be available for inspection.

9. An occupier importing Hazardous Waste listed under an open general licence of Directorate General of Foreign trade shall register himself with the Ministry of Environment and Forest or any other authority or agency such as Central Pollution Control Board.

Illegal traffic

(Rule 15):

(1) The movement of hazardous wastes from or to the country shall be considered illegal.-

(i) if it is without prior permission of the Central Government;

(ii) if the permission has been obtained through falsification, misrepresentation or fraud; or

(iii) it does not conform to the shipping details provided in the document.

(2) Incase of illegal movement, the hazardous wastes in question.-

(i) shall be shipped back within thirty days either to the exporter or to the exporting country;

(ii) shall be disposed of within thirty days from the date of off-loading subject to inability to comply with above in accordance with the procedure laid down by the State Pollution Control Board in consultation with Central Pollution Control Board.

(3) In case of illegal transboundary movement of hazardous wastes, the occupier exporting hazardous waste from the country or the exporter exporting hazardous waste to the country and importer importing hazardous waste into the country shall ensure that the wastes in question is safely stored and shipped or disposed off in an environmentally sound manner within thirty days from the date of off-loading.

(4) The exporting country shall bear the costs incurred for the disposal of such waste.

Appeal

(Rule 18):

(1) An appeal shall lie, against any order of grant or refusal of an authorization by the Member-Secretary, State Pollution Control Board or any officer designated by the Board to the Secretary, Department of Environment of the State Government by whatever name called.

(2) Every appeal shall be in writing and shall be accompanied by a copy of the order appealed against and shall be presented within thirty days of the receipt of the order passed.

(3) Every appeal filed under this rule shall be disposed of within a period of sixty days from the date of such filing.

Procedure for registration and renewal of registration of recyclers and re-refiners

(Rule 19):

(a) Recyclers/re-refiners of non-ferrous waste as specified in Schedule 4 or used oil or waste oil shall register with Central Pollution Control Board.

(b) Industrial units having captive recycling need not register with State Pollution Control Board so also the person registered with Ministry of Environment Forest.

(c) Application for registration to Central Pollution Control Board shall be made in Form-XI, along with

(i) consents under Water Act and Air Act.

(ii) authorization under Hazardous Waste Rules.

(iii) Certificate of registration with DIC.

(iv) Proof of installed capacity of plant issued by State Pollution Control Board or District Industries Center.

(v) Report of compliance to establish and emission standards issued by State Pollution Control Board.

(d) Central Pollution Control Board to dispose the application for registration within 120 days.

(e) Certificate of registration will be valid for 2 years from the date of issue.

(f) An appeal against the order of suspension, cancellation or refusal of registration or renewal passed by Central Pollution Control Board shall lie with Secretary, Ministry of Environment and Forest, GOI.

Responsibility of waste generator

(Rule 20):

(a) No owner or occupier generating non-ferrous metal waste (schedule 4) or waste oil or used oil of ten tones or more per annum shall sell or auction such wastes to a registered re-refiners or recycler who is having a valid certificate of registration.

(b) Waste oil which does not meet the specification laid down in Schedule 6 of the Rule shall not be auctioned or sold but shall be disposed of in Hazardous Waste incinerator installed with air pollution control devises and meeting emission standards.

(c) Waste generators and auctioneers shall not store the waste for more than 90 days.

(d) Waste generators and auctioneers shall file annual returns of auction and sale by 31st January of every year in Form-13 to State Pollution Control Board.

Technology & Standards for re-refining or recycling

(Rule 21):

(i) Re-refiners and recyclers shall use only environmentally sound technologies while recycling and re-refining non ferrous metal wastes or used oil

Environmentally Sound Technologies are :

(a) Vacuum distillation with clay treatment.

(b) Vacuum distillation with hydro treating

(c) Thin film evaporation process or any other technology approved by Ministry of Environment and Forest

Note : The Schedules listed in the Rules are as under: (for details please refer gazette notification/bare Acts).

Schedule Number	Particulars
Schedule-1	List of Hazardous Waste
Schedule-2	List of waste constituents with concentration limit
Schedule-3	Part (A) List of waste applicable for imports and exports. Part (B) List of Hazardous Characteristics.
Schedule-4	List of non-ferrous metal waste applicable for registration of ecyclers.
Schedule-5	Specification for used oil suitable for re-refining.
Schedule-6	Specification for waste oil suitable for recycling.
Schedule-7	List of authorities and corresponding duties
Schedule-8	Hazardous Waste prohibited for import and export.

3.1.3 THE MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICALS RULES, 1989

The objective of this rule is to regulate the manufacture, storage, import and export of hazardous chemicals

Important Definitions

(a) **"hazardous chemical"** means, -

(i) any chemical which satisfies any of the criteria laid down in Part I of [Schedule 1 or] listed in column 2 of Part II of this Schedule;

(ii) any chemical listed in column 2 of Schedule 2;

(iii) any chemical listed in column 2 of Schedule 3;

(b) **"industrial activity"** means, -

(i) an operation or process carried out in an industrial installation referred to in Schedule 4 involving or likely to involve one or more hazardous chemicals and includes on-site storage or on-site transport which is associated with that operation or process, as the case may be; or

(ii) isolated storage; or

(iii) pipeline;

(c) **"isolated storage"** means storage of a hazardous chemical, other than storage associated with an installation on the same site specified in Schedule 4 where that storage involves at least the quantities of that chemical set out in Schedule 2;

(d) **"major accident"** means - an incident involving loss of life inside or outside the installation, or ten or more injuries inside and / or one or more injuries outside or release of toxic chemicals or explosion or fire or spillage of hazardous chemicals resulting in on-site or off-site emergencies of damage to equipment leading to stoppage of process or adverse affects to the environment;

(da) **"major accident hazards (MAH) installations"** means - isolated storage and industrial activity at a site handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities specified in, column 3 of Schedules 2 and 3 respectively;]

(e) **"pipeline"** means a pipe (together with any apparatus and works associated therewith) or system of pipes (together with any apparatus and works associated therewith) for the conveyance of a hazardous chemical other than a flammable gas as set out in column 2 of Part II of Schedule 3 at a pressure of less than eight bars absolute; the pipeline also includes inter-state pipelines;

(f) **"Schedule"** means Schedule appended to these rules;

Schedule I

Part I

(a) **Toxic chemicals:** Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties, are capable of producing major accident hazards:

Sl.	Toxicity	Oral toxicity LD50 (mg/kg)	Dermal toxicity LD50 (mg/kg)	Inhalation toxicity No. LC50 (mg/l)
1.	Extremely toxic	>5	<40	<0.5
2.	Highly toxic	>5-50	>40-200	<0.5-2.0
3.	Toxic	>50-200	>200-1000	>2-10

(b) Flammable chemicals:

(i) **Flammable gases:** Gases which at 20°C and at standard pressure of 101.3 KPa are:-

(a) ignitable when in a mixture of 13 per cent or less by volume with air, or

(b) have a flammable range with air of at least 12 percentage point regardless of the lower flammable limits. Note:-The flammability shall be determined by tests or by calculation in accordance with methods adopted by International Standards organization ISO Number 10156 of 1990 or by Bureau of Indian Standards ISI Number 1446 of 1985.

(ii) Extremely flammable liquids: Chemicals which have flash point lower than or equal to 23°C and boiling point less than 35°C.

(iii) Very highly flammable liquids: Chemicals which have a flash point lower than or equal to 23°C and initial boiling point higher than 35°C.

(iv) Highly flammable liquids: Chemicals which have a flash point lower than or equal to 60°C but higher than 23°C.

(v) Flammable liquids: Chemicals which have a flash point higher than 60°C lower than 90°C.

(c) **Explosive:** explosives means a solid or liquid or pyrotechnic substance (or a mixture of substances) or an article.

(a) which is in itself capable of chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings;

(b) which is designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self sustaining exothermic chemical reaction.

Part II

List of 684 hazardous chemicals is given in this schedule. (Please refer the original schedule).

Schedule II

This schedule gives the list of hazardous chemicals with thresh hold quantities for Isolated Storage at Installation other than those covered by schedule IV.

Schedule III

This schedule gives the list of hazardous chemicals with thresh hold quantities for application of Rule 5 and 7 to 15.

Schedule IV

1. Installations for the production, processing or treatment of organic or inorganic chemicals using for this purpose, among others:

    (a) alkylation
    (b) amination by ammonolysis
    (c) carbonylation
    (d) condensation
    (e) dehydrogenation
    (f) esterification
    (g) halogenation and manufacture of halogens
    (h) hydrogenation
    (i) hydrolysis
    (j) oxidation
    (k) polymerization
    (l) sulphonation
    (m) desulphurization, manufacture and transformation of sulphur- containing compounds
    (n) nitration and manufacture of nitrogen-containing compounds
    (o) manufacture of phosphorous-containing compounds
    (p) formulation of pesticides and of pharmaceutical products
    (q) distillation
    (r) extraction
    (s) salvation
    (t) mixing

2. Installations for distillation, refining or other processing of petroleum of petroleum products.
3. Installations for the total or partial disposal of solid or liquid substances by incineration or chemical decomposition.
4. Installations for production, processing [use] or treatment of energy gases, for example, LPG, LNG, SNG.
5. Installations for the dry distillation of coal or lignite.
6. Installations for the production of metals or non-metals by a wet process or by means of electrical energy.

Schedule V

In this schedule list of authorities indicating their duties is given.

Rule 4 - General responsibility of the occupier during industrial activity

This Rule apply to industrial activity in which hazardous chemicals are involved in Isolated Storages. The occupier has to identify the major accident hazardous and take adequate steps to prevent major accidents effecting the environment.

Rule 5 - Notification of major accidents

The occupier has to furnish details of major accident at site to the concerned authorities and also furnish the steps taken to avoid repetition of such occurrence. The concerned authority will undertake full analysis of the accident

Rule 7 - Approval and notification of sites

The occupier shall obtain prior approval of the concerned authority for storage of hazardous chemicals.

Rule 8 - Updating the site notification

The occupier has to get the approval from the concerned authorities for any change in decreasing or increasing the maximum thrush hold quantities of hazardous chemicals.

Rule 10 & 11 - Safety reports and safety audit report and updating

The occupier has to prepare safety report on the industrial activity and submit it to the concerned authority before undertaking any industrial activity. The occupier has to conduct independent safety audit of industrial activity with the help of an independent expert and this report should be submitted to concerned authority, his audit report is to be updated every year. The occupier shall within three years of the date of last report prepare a new report incorporate new technical knowledge relating to safety and hazard assessment and send a copy to concerned authority.

Rule 13 - Preparation of on-site emergency plan

The occupier shall prepare and keep up to date an off-site emergency plan. Detailing how major accidents will be dealt with on the site. The occupier shall ensure that the emergency plan prepared takes into account any modification made in the industrial activity and that every person on the site who is affected by the plan is informed of its relevant provisions. The occupier shall conduct mock drill of the on-site emergency plan every six months.

Rule 14 - Preparation of off-site emergency plan

The concerned authority has to prepare the emergency plan collecting such information relating industrial activity including the nature, extent and likely effects off-site of possible major accidents. The concerned authority shall ensure that rehearsal of the off-site emergency plan is conducted atleast once in a calendar year.

Rule 15 - Information to be given to persons liable to be affected major accidents

The occupier shall take appropriate steps to inform persons outside the site either directly or through District Emergency Authority who are likely to be in an area which may be affected by a major accident about, -

(a) the nature of the major accident hazard; and

(b) the safety measures and the "Dos" and "Don'ts" which should be adopted in the event of a major accident.

Rule 18 - Import of hazardous chemical

The importer of hazardous chemical shall obtain the permission of the concerned authority by furnishing information 30 days prior to such import of hazardous chemical. The concerned authority if satisfied will issue permission with a direction to follow safety measures or may direct stoppage on environmental consideration or on safety.

3.1.4 RULES FOR THE MANUFACTURE, USE, IMPORT, EXPORT & STORAGE OF HAZARDOUS MICRO-ORGANISMS/ GENETICALLY ENGINEERED ORGANISMS OR CELLS, 1989.

The Department of Bio-technology under the Ministry of Science and Technology is the nodal agency for granting licenses for manufacture, import and export of microorganisms and genetically engineered organisms. However, such licenses are issued only after the proposal is cleared from the environmental angle by the Ministry of Environment & Forests.

For according such clearances, the Ministry has notified the "Rules for Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms and Genetically Engineered Organisms or Cells" in 1989 under the Environment (Protection) Act, 1986.

The investor is required to submit an application in the prescribed proforma to the Ministry of Environment and Forests.

The Genetic Engineering Approval Committee (GEAC) constituted by the Ministry of Environment & Forests examines the application form and makes recommendations.

All industries involving hazardous micro-organisms or genetically engineered organisms, are required to constitute an Institutional Bio-Safety Committee (IBSC) to oversee the planning and execution of various operations in a safe manner and to prepare an on-site emergency plan to deal with any accident which may occur due to hazardous micro-organism.

3.1.5 CHEMICAL ACCIDENTS (EMERGENCY PLANNING, PREPAREDNESS & RESPONSE) RULES 1996.

"Chemical Accident" means an accident involving a fortuitous, or sudden or unintended occurrence while handling any hazardous chemicals resulting in continuous, intermittent or repeated exposure to death or injury to, any person or damage to any property.

Functions of the Crisis Groups:

The general functions of the crisis group are:

- The Central Crisis Group shall be the apex body to deal with major chemical accident and to provide expert guidance for handling major chemical accidents.
- Conduct post accident analysis and to monitor to check recurrence of such accidents.
- Assist in preparation of off-site emergency plan.
- To review all the on-site emergency plan prepared by industries.
- Central Crisis Group will review progress report by State Crisis Group, to publish State-wise list of experts and officials who are concerned with handling of chemicals accident and to render financial and infrastructural help to the State.
- State Crisis Group will review all district off-site emergency plan, assist in managing chemical accident at site, assist in mitigation of major accident, monitor the post accident situations and respond to the queries of District Crisis Group and also publish list of experts in management of chemical accidents.
- The District Crisis Group will assist in preparation of district off-site emergency plan, review on-site emergency plans, assist the district administration in management of chemical accidents, monitor the accidents and report to the Central & State Crisis Group regarding accident situation and mitigation efforts.
- Local Crisis Group will prepare local emergency plan for industrial pocket, train personnel involved in chemical accident management, educate the population about the remedies the chemical accident and existing preparedness in the area and to conduct atleast one full scale mock-drill of chemical accident at site every six months.

Toxic chemicals:

Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties are capable of producing major accident hazard.

Sl.No.	Degree of toxicity	Oral toxicity LD 50 (mg/kg)	Dermal toxicity (dermal LD50) (mg/kg)	Inhalation toxicity by dust & mist (mg/l)
1	Extremely toxic	1-50	1-200	0.1-0.5
2	Highly toxic	51-500	201-2000	0.5-2.0

Flammable chemicals:

(i) Flammable gases: chemicals which in the gaseous state at normal pressure and mixed with air become flammable and the boiling point of which at normal pressure is 20^0C or below;

(ii) Highly flammable liquids: chemicals which have a flash point lower than 23^0C and the boiling point of which at normal pressure is above 20^0C;

(iii) Flammable liquids: chemicals which have a flash point lower than 65°C and which remain liquid under pressure, where particular processing conditions, such as high pressure and high temperature, may create major accident hazards.

Explosives:

Chemicals which may explode under the effect of flame, heat or photo-chemical conditions or which are more sensitive to shocks or friction than dinitro-benzene.

3.1.6 BIO-MEDICAL WASTE (MANAGEMENT & HANDLING) RULES,

- These Rules came into force from 20th July 1998
- These Rules apply to all persons who generate, collect, receive, store, transport, treat, dispose or handle bio-medical waste in any form.
- **"Bio-medical waste"** means, any waste, generated during the diagnosis, treatment or immunization of human beings or animals or in research activity or in the production or testing of biologicals and including categories mentioned in Schedule-I.

Duty of Occupier

- Take all steps to ensure that waste is handled without any adverse effect to human health and the environment.
- To install an appropriate facility to ensure requisite treatment of waste in accordance with Schedule-I and in compliance with standards prescribed.
- Ensure proper segregation of waste at the point of generation.
- Ensure proper labeling of containers/bags.
- Make an application in Form-I to the Karnataka State Pollution Control Board for grant of authorization.
- Submit Annual Report to Karnataka State Pollution Control Board in Form-II by 31st January every year.
- Maintain records about operation, collection, storage, treatment and disposal of wastes.
- Report accidents occurred while handling waste in Form III to Karnataka State Pollution Control Board.

Prescribed Authority:

- Karnataka State Pollution Control Board is the Prescribed Authority in the State to enforce the provisions of the Rules.
- Director General, Armed Forces is the Prescribed Authority to enforce the Rules in all health care establishment of the Armed forces under the Ministry of Defence.

Categories Of Bio-Medical Waste

SCHEDULE-I

Waste Category Number	Waste Category (Type)	Treatment & Disposal Option
Category No.1.	**Human Anatomical Waste** (human tissues, organs, body parts)	Incineration+ /deep burial*
Category No.2.	**Animal Waste** (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)	Incineration+ /deep burial*
Category No.3.	**Microbiology & Biotechnology Waste** (wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	Local autoclaving/micro-waving/ incineration
Category No.4.	**Waste sharps** (needles, syringes, scalpels, blades, glass, etc., that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection by chemical treatment++ /auto claving/ microwaving and mutilation/ shredding# #
Category No.5.	**Discarded Medicines and Cytotoxic drugs** (wastes comprising of outdated, contaminated and discarded medicines)	Incineration# /destruction and drugs disposal in secured landfills
Category No.6.	**Soiled Waste** (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, linen, beddings, other material contaminated with blood)	Incineration+ autoclaving/ micro-waving
Category No.7.	**Solid Waste** (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets, etc.)	Disinfection by chemical treatment++ /auto claving/ mcro-waving and mutilation/ shredding# #
Category No.8.	**Liquid Waste** (waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfection by chemical treatment++ and discharge into drains
Category No.9.	**Incineration Ash** (ash from incineration of any bio-medical waste)	Disposal in municipal landfill
Category No.10.	**Chemical Waste** (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc)	Chemical treatment++ and discharge into drains for liquids and secured landfill for solids

- Chemicals treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.
- ## Mutilation/shredding must be such so as to prevent unauthorized reuse.
- There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.
- Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

Segregation of wastes

- Bio-medical waste shall not be mixed with other wastes.
- Bio-medical waste shall be segregated at the point of generation in accordance with Schedule-II prior to its storage, transportation, treatment and disposal.
- Bio-medical waste shall be transported only in vehicles authorized for the purpose by Karnataka State Pollution Control Board.
- No untreated Bio-medical Waste shall be kept stored beyond a period of 48 hrs.

COLOUR CODING AND TYPE OF CONTIANER FOR DISPOSAL OF BIO-MEDICAL WASTES (SCHEDULE - II)

Colour Coding	Type of Container	Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat. 1, Cat. 2 and Cat. 3 and Cat. 6	Incineration/deep burial
Red	Disinfected container/plastic bag	Cat. 3, Cat. 6 Cat. 7	Autoclaving/Microwaving/ Chemical Treatment
Blue/White translucent	Plastic bag/puncture proof container	Cat.4, Cat.7	Autoclaving/Microwaving/ Chemical Treatment and destruction/shredding
Black	Plastic bag	Cat. 5 and Cat.9 and Cat. 10 (solid)	Disposal in secured landfill

Note:

1. Colour coding of waste categories with multiple treatment options as defined in Schedule I, shall be selected depending on treatment option chosen, which shall be as specified in Schedule I.
2. Waste collection bag for waste types needing incineration shall not be made of chlorinated plastics.
3. Categories 8 and 10 (liquid) do not require containers/bags.
4. Category 3 if disinfected locally need not be put in containers/bags.

Role of Municipal Bodies

- The Municipal body of the area shall continue to pick up and transport segregated non Bio-medical Solid Waste generated in hospitals and nursing homes, as well as duly treated bio-medical wastes for disposal at municipal dump site.
- The Municipal corporations, Municipal Boards of urban local bodies shall be responsible for providing suitable common disposal sites/incinerators for the wastes generated in the area under their jurisdiction.

Standards for treatment and disposal of Bio-Medical wastes:

Standards for Incinerators:

All incinerators shall meet the following operating and emission standards-

A. Operating standards

1. Combustion Efficiency (CE) shall be at least 99.00%
2. The Combustion efficiency is computed as follows:

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$

3. The temperature of the primary chamber shall be 800 ± 50°C.
4. The Secondary chamber gas residence time shall be at least 1 (one) second at 1050 ± 50°C, with minimum 3% Oxygen in the stack gas.

B. Emission standards

Parameters (concentration in mg/Nm^3 at (12% CO_2 correction)

1.	Particulate Matter	150
2.	Nitrogen Oxides	450
3.	HCl	50

4. Minimum stack height shall be 30 meters above ground.
5. Volatile organic compounds in ash shall not be more than 0.01%

Note:

- ❖ Suitably designed pollution control devices should be installed/retrofitted with the incinerator to achieve the above emission limits, if necessary.
- ❖ Wastes to be incinerated shall not be chemically treated with any chlorinated disinfectants.
- ❖ Chlorinated plastics shall not be incinerated.
- ❖ Toxic metals in incineration ash shall be limited within the regulatory quantities as defined under the Hazardous Waste (Management and Handling) Rules 1989.
- ❖ Only low Sulphur fuel like L.D.O./L.S.H.S./Diesel shall be used as fuel in the incinerator.

Operational problems in Incinerator:

1. Black smoke is due to unburned material because of incomplete combustion. This is mainly due to over-charging of materials.
2. White smoke is mainly due to presence of aerosols indicting low operational temperature in secondary chamber.
3. Leakage of smoke through door openings indicates pressure difference in primary chamber.
4. Over-charging of material/waste shall be avoided to prevent malfunctioning.

Pollution control system for Incinerator:

Wet scrubbers are used to remove particulate matter, hydrochloric acid, sulphur di-oxide, etc. Fabric

filters are used to remove particulate matter. Dry scrubbers are used to remove Hydrochloric Acid, Sulphur Di-oxide and other acid gases. Alkaline absorbents are used to neutralize Acid gases. Dry scrubbers are usually followed by fabric filters or electrostatic precipitator.

Standards for waste Autoclaving

The autoclave should be dedicated for the purposes of disinfecting and treating bio-medical waste-

(I) When operating a gravity flow autoclave, medical waste shall be subjected to:

(i) a temperature of not less than 121^{0}C and pressure of 15 pounds per square inch (psi) for an autoclave residence time of not less than 60 minutes; or

(ii) a temperature of not less than 135^{0}C and a pressure of 31 psi for an autoclave residence time of not less than 45 minutes; or

(iii) a temperature of not less than 149^{0}C and a pressure of 52 psi for an autoclave residence time of not less than 30 minutes.

(II) When operating a vacuum autoclave, medial waste shall be subjected to minimum of one pre-vaccum pulse of purge the autoclave of all air. The waste shall be subjected to the following.

(i) a temperature of not less than 121^{0}C and pressure of 15 psi per an autoclave residence time of the not less than 45 minutes; or

(ii) a temperature of not less than 135^{0}C and a pressure of 31 psi for an autoclave residence time of not less than 30 minutes.

(III) Medical waste shall be not be considered properly treated unless the time, temperature and pressure indicators indicate that the required time, temperature and pressure were reached during the autoclave process. If for any reasons, time temperature or pressure indicator indicates that the required temperature, pressure or residence time was not reached, the entire load of medical waste must be autoclaved again until the proper temperature, pressure and residence time were achieved.

(IV) **Recording of operational parameters**

Each autoclave shall have graphic or computer recording devices, which will automatically and continuously monitor and record dates, time of day, load identification number operating parameters throughout the entire length of the autoclave cycle.

(V) **Validation tests**

Spore testing:

The autoclave should completely and consistently kill the approved biological indicator at the maximum design capacity of each autoclave unit. Biological indicator for autoclave shall be Bacillus Stearothermophilus Spores using vials or spore strips, with at least 1 x 104 spores per milliliter. Under no circumstances will an autoclave have minimum operating parameters less than a residence time of 30 minutes, regardless of temperature and pressure, a temperature less than 121^{0}C or a pressure less than 15 psi.

(VI) **Routine test:**

A chemical indicator strip/tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature ahs been achieved. It may be necessary to use more than one strip over the waste package at different location to ensure that the liner content of the package has been adequately autoclaved.

Standards for liquid waste:

The effluent generated from the hospital should conform to the following limits:

Parameters	Permissible Limits
pH	6.5-9.0
Suspended Solids	100 mg/l
Oil and grease	10 mg/l
BOD	30 mg/l
COD	250 mg/l
Bio-assay test	90% survival of fish after 96 hours in 100% effluent.

these limits are applicable to those hospitals, which are either connected with sewer without terminal sewage treatment plan or not connected to public sewers. For discharge into public sewers with terminal facilities, the general standards as notified under the Environmental (Protection) Act, 1986 shall be applicable.

Standards of Microwaving:

1. Microwave treatment shall not be used for cytotoxic, hazardous or radioactive wastes, contaminated animal carcasses, body parts and large metal items.
2. the microwave system shall comply with efficacy test/routine tests and a performance guarantee may be provided by the supplier before operation of the unit.
3. The microwave should completely and consistently kill the bacteria and other pathogenic organisms that is ensured by approved biological indicator at the maximum design capacity of each microwave unit, Biological indicators for microwave shall be Bacillus Subtilis spores using vials or spore strips with at least 1 x 104 spores per milliliter.

Standards for Deep Burial

1. A pit or trench should be dug about 2 meters deep. It should be half filled with waste, then covered with lime within 50 cm of the surface, before filling the rest of the pit with soil.
2. It must be ensured that animals do not have any access to burial sites. Covers of galvanized iron/ wire meshes may be used.
3. On each occasion, when wastes are added to the pit, a layer of 10 cm of soil shall be added to cover the wastes.
4. Burial must be performed under close and dedicated supervision.
5. The deep burial site should be relatively impermeable and no shallow well should be closed to the site.
6. The pits should be distant from habitation, and sited so as to ensure that no contamination occurs of any surface water or ground water. The area should not be prone to flooding or erosion.
7. The location of the deep burial site will be authorized by the prescribed authority.
8. The institution shall maintain a record of all pits for deep burial.

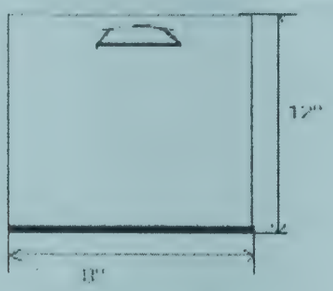
3.1.7 PLASTICS MANUFACTURE, SALE AND USAGE RULES, 1999.

These Rules came into force with effect from 2-9-1999.

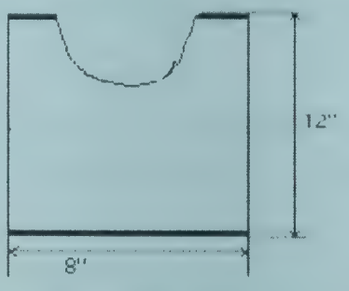
Important Definitions

(Rule 3):

a. **"carry bags"** means plastic bags which have a self carrying feature commonly known as vest type bags or any other feature used to carry commodities such as "D" punched bags; as illustrated below;



"D" Punched Bag



Vest Type Bag

b. **"commodities"** includes articles such as vegetables, fruits, pharmaceuticals and the like;

c. **"container"** means flexible or rigid containers made of virgin plastics or recycled plastics with or without lid used to store, carry or dispense commodities;

d. **"food-stuffs"** means ready to eat food articles and food products, fast food, processed or cooked food in liquid, powder, solid or semi-solid form;

e. **"registration"** means registration of units manufacturing carry-bags and containers made of virgin or recycled plastics with the concerned State Pollution Control Board or Pollution Control Committee as the case may be;

f. **"vendor"** means a person who sells food stuffs packed or stored in plastic carry bags or containers.

Prescribed Authority

(a) The prescribed authority for enforcement of the provisions of these rules related to manufacture and recycling shall be the State Pollution Control Boards/Pollution Control Committees;

(b) The prescribed authority for enforcement of the provisions of these rules related to the use, collection, segregation, transportation and disposal shall be the District Collector/Deputy Commissioner of the concerned district where no such Authority has been constituted by the State Government/Union Territory administration under any law regarding non-biodegradable garbage.

Restriction on Manufacture, sale, distribution and use of virgin and recycled plastic carry bags and recycled plastic containers

(Rule 4):

(1) Manufacturer, stocking, distribution or selling of carry bags made of virgin or recycled plastic bags which are less than 8x12 inches (20x30 cms) in size and which do not conform to the minimum thickness specified in these rule are prohibited.

(2) No vendor shall use carry bags made of recycled plastic for storing, carrying, dispensing or packaging of foodstuffs.

(3) No vendor shall use containers made of recycled plastics for storing, carrying, dispensing or packaging of food stuffs.

Explanation

For the purpose of this rule, the minimum weight of 50 carry bags made of virgin or recycled plastics shall be 105 gms. plus or minus 5% variation and the carry bags of larger sizes shall be of proportionate increase in weight.

Note: The provisions of the Rule 4 shall not apply to the manufacture of carry bags exclusively for export purpose, against an order for export received by the owner or occupier of the concerned manufacturing unit.

Conditions of manufacture of carrybags and containers made of plastics

(Rule 5):

As per the provisions of these Rules, manufacture of carrybags or containers made of plastics is permitted if the following conditions are satisfied, namely:-

(a) Carry bags and containers made of virgin plastic shall be in natural shade or white;

(b) Carry bags and containers made of recycled plastic and used for purposes other than storing and packaging foodstuffs shall be manufactured using pigmets and colourants as per IS:9833:1981 entitled "List of pigments and colourants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water".

Recycling

(Rule 6):

Recycling of plastics shall be undertaken strictly in accordance with the Bureau of Indian Standards Specification IS14534:1998 entitled "The Guidelines for Recycling of Plastics".

Marking/codification

(Rule 7):

Manufacturers of recycled plastic carry bags having printing facilities shall code/mark carry bags and containers as per Bureau of Indian Standards Specification IS 14534:1998 entitled "The Guidelines for Recycling of Plastics" and the end product made out of recycled plastics shall be marked as "recycled" along with the indication of the percentage of use of recycled material. Other manufacturers, who do not have printing facilities, shall comply with the condition within one year of publication of these rules. Manufacturers shall print on each packet of carry bags as to whether these are made of "recycled material" or of "virgin plastic".

Thickness of carry bags

(Rule 8)

The minimum thickness of carry bags made of virgin plastics or recycled plastics shall not be less than 20 microns.

The provisions of the Rule 8 shall not apply to the manufacture of carry bags exclusively for export purpose, against an order for export received by the owner or occupier of the concerned manufacturing unit.

Grant of registration for manufacturers

(Rule 10):

Every occupier manufacturing carry bags or containers of virgin plastic or recycled plastic or both shall make an application in Form-I to the concerned State Pollution Control Board/Pollution Control Committee for grant of registration/renewal of registration.

No person shall manufacture carrybags or containers irrespective of size or weight without registration from State Pollution Control Board/Pollution Control Committee prior to commencement of production.

State Pollution Control Board/Pollution Control Committee shall not issue and renew a registration certificate of a unit unless that unit meets norms prescribed under these Rules and also posses a valid consent under Water Act, & Air Act.

Every application for renewal of registration shall be made in the Form-I prescribed under the Rule at least 60 days before the expiry of the validity of registration.

3.1.8 MUNICIPAL SOLID WASTE (MANAGEMENT & HANDLING) RULES 2000

Objective

These rules shall apply to every Municipal Authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes.

Responsibility of Municipal Authority:

(1) Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.

(2) The Municipal Authority or an operator of a facility shall make an application in Form-I for grant of authorization for setting up of waste processing & disposal facility from State Board.

(3) The Municipal authority shall furnish its annual report in prescribed format to (a) The Secretary incharge of Department of Urban Development (b) The District Magistrate or the Deputy Commissioner, with a copy to State Pollution Control Board before 30th June every year.

Responsibility of the State Government and the District Magistrate or the Deputy Commissioner:

(a) The Secretary, Department of Urban Development of the State shall have overall responsibility for enforcement of the provisions of these Rules in Metropolitan Cities.

(b) The District Magistrate or the Deputy Commissioner of the concerned district shall have overall responsibility for the enforcement of the provisions of these rules within the territorial limits of their jurisdiction.

Responsibility of State Board:

(a) The State Pollution Control Board shall monitor the compliance of the standards regarding ground water, ambient air, leachate quality and compost quality including incineration standards as specified in the Rules.

(b) The State Board or the Committee, after receipt of application from the municipal authority or the operator of a facility in Form I, for grant of authorization for setting up waste processing and disposal facility including landfills, shall examine the proposal taking into consideration the views of other agencies like the State Urban Development Department, the Town and Country Planning Department, Air Port or Air Base Authority, the Ground Water Board or any such other agency prior to issuing the authorization.

(c) State Board will issue authorization within 45 days of receipt of application.

Management of Municipal Solid Waste

(Rule 7):

Any Municipal Solid Waste generated in a city or a town shall be managed and handled as per compliance criteria and procedure laid down in Schedule II of the Rules.

Annual report

(Rule 8):

The State Board to prepare and submit to Central Pollution Control Board an annual report with regard to implementation of Municipal Solid Waste Rules in the State by 15th September every year.

Accident reporting

(Rule 9):

When an accident occurs at any municipal solid wastes collection, segregation, storage, processing, treatment and disposal facility or landfill site or during the transportation of such wastes, the municipal authority shall forthwith report the accident in Form V to the Secretary incharge of the Urban Development Department in Metropolitan cities, and to District Collector or Deputy Commissioner in all other cases.

Responsibility of Central Pollution Control Board:

The Central Pollution Control Board shall coordinate with the State Pollution Control Boards in implementation and review of standards, guidelines and compilation of monitoring data.

Implementation Schedule
(SCHEDULE- I)

Sl.No.	Compliance Criteria	Schedule
1.	Setting up of waste processing and disposal facilities	By 31-12-2003 or earlier
2.	Monitoring the performance of waste processing and disposal facilities	Once in six months
3.	Improvement of existing landfill sites as per provisions of these rules	By 31-12-2001 or earlier
4.	Identification of landfill sites for future use and making site (s) ready for operation	By 31-12-2002 or earlier

Collection of Municipal Solid Wastes

(SCHEDULE- II)

1. Littering of municipal solid waste shall be prohibited in cities, towns and in urban areas notified by the State Governments. To prohibit littering and facilitate compliance, the following steps shall be taken by the municipal authority, namely:-

   (i) Organising house-to-house collection of municipal solid wastes through any of the methods, like community bin collection (central bin), house-to-house collection, collection on regular pre-informed timings and scheduling by using bell ringing of musical vehicle (without exceeding permissible noise levels);

   (ii) Wastes from slaughter houses, meat and fish markets, fruits and vegetable markets, which are biodegradable in nature, shall be managed to make use of such wastes;

   (iii) Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose;

   (iv) Horticultural and construction or demolition wastes or debris shall be separately collected and disposed of following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws;

2. The municipal authority shall notify waste collection schedule and the likely method to be adopted for public benefit in a city or town.

3. It shall be the responsibility of generator of wastes to avoid littering and ensure delivery of wastes in accordance with the collection and segregation system to be notified by the municipal authority as per para 1(2) of this Schedule.

Segregation of Municipal Solid Wastes:

In order to encourage the citizens, municipal authority shall organize awareness programmes for segregation of wastes and shall promote recycling or reuse of segregated materials. The municipal authority shall undertake phased programme to ensure community participation in waste segregation. For this purpose, regular meetings at quarterly intervals shall be arranged by the municipal authorities with representatives of local resident welfare associations and non-governmental organizations.

Storage of Municipal Solid Wastes:

Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic and insanitary conditions around it. Following criteria shall be taken into account while establishing and maintaining storage facilities namely:-

(i) Storage facilities shall be created and established by taking into account quantities of waste generation in a given area and the population densities. A storage facility shall be so placed that it is accessible to users;

(ii) Storage facilities to be set up by municipal authorities or any other agency shall be so designed that wastes stored are not exposed to open atmosphere and shall be aesthetically acceptable and user-friendly;

(iii) Storage facilities or 'bins' shall have 'easy to operate' design for handling, transfer and transportation of waste. Bins for storage of bio-degradable wastes shall be painted green, those for storage of recyclable wastes shall be painted white and those for storage of other wastes shall be painted black;

(iv) Manual handling of waste shall be prohibited. If unavoidable due to constraints, manual handling shall be carried out under proper precaution with due care for safety of workers.

Transportation of Municipal Solid Wastes

Vehicles used for transportation of wastes shall be covered. Waste should not be visible to public, nor exposed to open environment preventing their scattering. The following criteria shall be met, namely:-

(i) The storage facilities set up by municipal authorities shall be daily attended for clearing of wastes. The bins or containers wherever placed shall be cleared before they start overflowing:

(ii) Transportation vehicles shall be so designed that multiple handling of wastes, prior to final disposal is avoided.

Processing of Municipal Solid Wastes:

Municipal authorities shall adopt suitable technology or combination of such technologies to make use of wastes so as to minimize burden or landfill. Following criteria shall be adopted, namely:-

(i) The biodegradable wastes shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of wastes. It shall be ensured that compost or any other end product shall comply with standards as specified in Schedule IV:

(ii) Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state- of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorization.

Disposal of Municipal Solid Wastes:

Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Land filling or mixed waste shall be avoided unless the same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternate facilities, land filling shall be done following proper norms. Landfill sites shall meet the specifications as given is Schedule - III.

Site selection:

1. In areas falling under the jurisdiction of 'Development Authority' it shall be the responsibility of such Development Authority to identify the landfill sites and hand over the sites to the concerned municipal authority for development, operation and maintenance. Elsewhere, this responsibility shall lie with the concerned municipal authority.
2. Selection of landfill sites shall be based on examination of environmental issues. The Department of Urban Development of the State or the Union territory shall coordinate with the concerned organizations for obtaining the necessary approvals and clearances.
3. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as closure plan.
4. The landfill sites shall be selected to make use of nearby wastes processing facility. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.
5. The existing landfill sites which continue to be used for more than five years, shall be improved in accordance with the specifications given in this Schedule.
6. Biomedical wastes shall be disposed of in accordance with the Bio-medical Wastes (Management and Handling) rules, 1998 and hazardous wastes shall be managed in accordance with the Hazardous Wastes (Management and Handling) Rules, 1989, as amended from time to time.
7. The landfill site shall be large enough to last for 20-25 years.
8. The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National parks, Wetlands and places of important cultural, historical or religious interest.
9. A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.
10. Landfill site shall be away from airport including airbase. Necessary approval of airport or airbase authorities prior to the setting up of the landfill site shall be obtained in cases where the site is to be located within 20 km of an airport or airbase.

3.1.9 THE NOISE POLLUTION (REGULATION & CONTROL) RULES, 2000

The increasing ambient noise levels in public places from various sources, inter alia, industrial activity, construction activity, generator sets, loud speakers, public address systems, music systems, vehicular horns and other mechanical devices have deleterious effects on human health and the psychological well being of the people. It is considered necessary to regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise.

Important Definitions

(Rule 2):

(a) **"authority"** means and includes any authority or officer authorized by the Central Government, or as the case may be, the State Government in accordance with the laws in force and includes a District Magistrate, Police Commissioner, or any other officer not below the rank of the Deputy Superintendent of Police designated for the maintenance of the ambient air quality standards in respect of noise under any law for the time being in force;

(b) **"educational institution"** means a school, seminary, college, university, professional academies, training institutes or other educational establishment, not necessarily a chartered institution and includes not only buildings, but also all grounds necessary for the accomplishment of the full scope of educational instruction, including those things essential to mental, moral and physical development;

(c) **"hospital"** means an institution for the reception and care of sick, wounded, infirm or aged persons, and includes government or private hospitals, nursing homes and clinics.

Ambient air quality standards in respect of noise for different areas/zones

(Rule 3):

(1) The Ambient air quality standards in respect of noise for different areas/zones are as follows:

SCHEDULE

Area code	Category of area/zone	Limits in dB (A) Leq*	
		Day time	Night Time
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

Note :

1. Day time shall mean from 6.00 a.m. to 10.00 p.m
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

*dB(A) Leq the time weighted average of the level of sound in decibels on Scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: Energy mean of the noise level over a specified period.

(2) The State Government to categorize the area into industrial, commercial, residential or silence areas/ zones for the purpose of implementation of noise standards.

(3) The State Government shall take measures for abatement of noise including the noise emanating from vehicular movements and ensure that the existing noise levels do not exceed the ambient air quality standards specified under these rules.

(4) All development authorities, local bodies and other concerned authorities while planning development activity or carrying out functions relating to town and country planning shall take into consideration all aspects of noise pollution as a parameter of quality of life to avoid noise menace and to achieve the objective of maintaining the ambient air quality standards in respect of noise.

(5) An area comprising not less than 100 meters around hospital, educational institutions and courts may be declared as silence area/zone for the purpose of these rules.

Responsibility as to enforcement of noise pollution control measures

(Rule 4):

The noise levels in any area/zone shall not exceed the ambient air quality standards in respect of noise as specified in the Schedule.

Restrictions on the use of loud speakers/public address system

(Rule 5):

(1) A loud speaker or a public address system shall not be used except after obtaining written permission from the authority.

(2) A loud speaker or a public address system shall not be used at night (between 10.00 p.m. to 6.00 a.m.) except in closed premises for communication within, e.g.auditoria, conference rooms, community halls and banquet halls.

(3) Notwithstanding anything contained in sub-rule (2), the State Government may, subject to such terms and conditions as are necessary to reduce noise pollution, permit use of loud speakers or public address systems during night hours (between 10.00 p.m. to 12.00 midnight) on or during any cultural or religious festive occasion of a limited duration not exceeding fifteen days in all during a calendar year.

Penalty

Consequences of any violation in silence zone/area

(Rule 6):

Whoever, in any place covered under the silence zone/area commits any of the following offence, he shall be liable for penalty under the provisions of the Environment (Protection) Act:-

(i) whoever, plays any music or uses any sound amplifiers,

(ii) whoever, beats a drum or tom-tom or blows a horn either musical or pressure, or trumpet or beats or sounds any instrument, or

(iii) whoever, exhibits any mimetic, musical or other performance of a nature to attract crowds.

Complaints to be made to the authority

(Rule 7):

(1) A person may, if the noise level exceeds the ambient noise standards by 10 dB (A) or more given in the corresponding columns against any area/zone, make a complaint to the authority.

Power to prohibit etc. continuance of music sound or noise

(Rule 8):

(1) If the authority is satisfied from the report of an officer in charge of a police station or other information received by him that it is necessary to do so in order to prevent annoyance, disturbance, discomfort or injury or risk of annoyance, disturbance, discomfort or injury to the public or to any person who dwell or occupy property on the vicinity, he may, by a written order issue such directions as he may consider necessary to any person for preventing, prohibiting, controlling or regulating:-

(a) the incidence or continuance in or upon any premises of-

(i) any vocal or instrumental music,

(ii) sounds caused by playing, beating, clashing, blowing or use in any manner whatsoever of any instrument including loudspeakers, public address system, application or apparatus or contrivance which is capable of producing or re-producing sound, or

(b) the carrying on in or upon, any premises of any trade, avocation or operation or process resulting in or attended with noise.

(2) The authority empowered under sub-rule (1) may, either on its own motion, or on the application of any person aggrieved by an order made under sub-rule (1), either rescind, modify or alter any such order:

Provided that before any such application is disposed of, the said authority shall afford to the applicant an opportunity of appearing before it either in person or by a person representing him and showing cause against the order and shall, if it rejects any such application either wholly or in part, record its reasons for such rejection.

Government of Karnataka Notification No.FEE 46 ENV 2000, dtd:13-8-2002 for regulation of noise

In exercise of the powers conferred by clause (ii) of sub section (2) of section, 3 sub section (1) and clause (b) of sub-section (2) of section 6 and section 25 of the Environment (Protection) Act, 1986 (26 Of 1986) read with rule 5 of the Environment (Protection) Rules, 1986 the State Government hereby issues following order for regulation and control of noise producing and generating sources situated in the Bangalore Development Authority Area as notified in the CDP for Bangalore city planning area approved in G.O. HUD 3 TTP 83, dtd 12.10.1984 issued by Housing & Urban Development Department & Revised CDP -2011AD for Bangalore local Planning authority approved in GO NO HUD -139 MNJ 94 dtd 5.1.1995 and Bangalore Metropolitan Region Development Authority Area as notified by BMRDA Act 1985(Karnataka Act No. 39 of 1985) published in Karnataka Gazette dtd 26.10.1985 and in the cities of Mysore, Gulbarga, Belgaum, and Hubli-Dharwad and in other areas of the State as per Government order issued under Karnataka Town & Country Planning Act 1961.

1. The noise levels in any of the categorized area/zone within the Bangalore Development Authority Area and Bangalore Metropolitan Region Development Authority Area and in the cities of Mysore, Gulbarga, Belgaum, and Hubli-Dharwad and other areas of the State shall not exceed the ambient air quality standards in respect of noise as specified in the schedule.

2. Responsibility as to enforcement of noise pollution control measures.

(1) Under Section 5 of the Environment (Protection) Act, 1986 the Government hereby issues directions to the Director General of Police, the Commissioner of Police in the cities of Bangalore, Mysore, Gulbarga, Belgaum and Hubli-Dharwad, and other officers of the Home Department not below the rank of the Deputy Superintendent of Police to take action against the persons who violate the standards prescribed in the schedule through the use of loud speakers/sirens/public address system or other modes of creating noise between 6.00 a.m to 10.00 p.m and 10.00 p.m to 6.00 p.m and to prosecute them under section 15 of the Environment (Protection) Act, 1986.

3.1.10. THE BATTERIES (MANAGEMENT & HANDLING) RULES, 2001

These rules apply to every manufacturer, importer, reconditioner, assembler, dealer, recycler, auctioneer, consumer and bulk consumer involved in manufacture, processing, sale, purchase and use of batteries or components.

Important Definitions

- **'assembler'** means a person who manufactures lead acid batteries by assembling various components;
- **'auctioneer'** means a person(s) who auctions used lead acid batteries or components, thereof;
- **'battery'** means lead acid battery which is a source of electrical energy and contains lead metal;
- **'bulk consumer'** means a consumer such as Central or State Government Departments of Railways, Defense, Telecom, Posts and Telegraph, State Road Transport Undertakings, State Electricity Boards and others who purchase batteries through Central 'rate' or running contract centrally placed on behalf of individual departments or user units under their jurisdiction;
- **'components'** means lead bearing components of a lead acid battery;
- **'consumer'** means a person using lead acid batteries excluding bulk consumers;
- **'dealer'** means a person who sells and receives lead acid batteries or components thereof to and from the consumers or other dealers or retailers on behalf of the manufacturers, importers, assemblers and reconditioners or otherwise;
- **'designated collection centre'** means a collection centre established, individually or jointly by one or more manufacturers or importers, assemblers and re-conditioners in pursuance of their responsibilities under rule 4 of these rules;
- **'importer'** means a person who imports new lead acid batteries or components containing lead thereof for the purpose of sale;
- **'manufacturer'** in relation to any factory manufacturing lead acid batteries or components thereof means a person or Chief Executive Officer (CEO) of the company who has control over the affairs of the factory or the premises for sale and collection of lead acid batteries or components thereof;
- **'original equipment manufacturer'** means manufacturer of equipment or product using lead acid batteries as a component;
- **'reconditioner'** means a person involved in repairing of lead acid batteries for selling the same in the market;
- **'recycler'** means an occupier who processes used lead acid batteries or components thereof for recovering lead;
- **'registered recycler'** means a recycler registered with the Ministry of Environment and Forests or an agency designated by it for reprocessing used lead acid batteries or components thereof;
- **'used batteries'** means used, damaged and old lead acid batteries or components thereof;

Responsibilities of manufacturer, importer, assembler, and re-conditioner

(Rule 4):

(i) ensure that the used batteries are collected back as per the Schedule against new batteries sold excluding those sold to original equipment manufacturer and bulk consumer(s);

(ii) ensure that used batteries collected back are of similar type and specifications as that of the new batteries sold;

(iii) file a half-yearly return of their sales and buy-back to the State Board in Form-I latest by 30th June and 31st December of every year;

(iv) set up collection centers either individually or jointly at various places for collection of used batteries from consumers or dealers;

(v) ensure that used batteries collected are sent only to the registered recyclers;

(vi) ensure that necessary arrangements are made with dealers for safe transportation from collection centers to the premises of registered recyclers;

(vii) ensure that no damage to the environment occurs during transportation;

(viii) create public awareness through advertisements, publications, posters or by other means with regard to the following:-

(a) hazards of lead;

(b) responsibility of consumers to return their used batteries only to the dealers or deliver at designated collection centers; and

(c) addresses of dealers and designated collection centers;

(ix) use the international recycling sign on the batteries;

(x) buy recycled lead only from registered recyclers; and

(xi) bring to the notice of the State Board or the Ministry of Environment and Forests any violation by the dealers.

Registration of importers

(Rule 5):

The importer shall get himself registered with the Ministry of Environment and Forests or an agency designated by it by submitting details in Form II.

Customs clearance of imports of new lead acid batteries

(Rule 6):

Customs clearance of imports shall be contingent upon-

(i) valid registration with the Reserve Bank of India (with Importer's Code Number);

(ii) one time registration with the Ministry of Environment and Forests or an agency designated by it in Form II;

(iii) undertaking in Form III; and

(iv) a copy of the latest half-yearly return in Form IV.

Responsibilities of dealer

(Rule 7):

(i) ensure that the used batteries are collected back as per the Schedule against new batteries sold;

(ii) give appropriate discount for every used battery returned by the consumer;

(iii) ensure that used batteries collected back are of similar type and specifications as that of the new batteries sold;

(iv) file half-yearly returns of the sale of new batteries and buy-back of old batteries to the manufacturer in Form V by 31st May and 30th November of every year;

(v) ensure safe transportation of collected batteries to the designated collection centres or to the registered recyclers; and

(vi) ensure that no damage is caused to the environment during storage and transportation of used batteries.

Responsibilities of recycler

(Rule 8):

(i) apply for registration to the Ministry of Environment and Forests or an agency designated by it if not applied already, by submitting information in Form VI;

(ii) ensure strict compliance of the terms and conditions of registration; however, those already registered with the Ministry of Environment and Forests or agency designated by it for reprocessing used batteries would be bound by the terms and conditions of such registration;

(iii) submit annual returns as per Form VII to the State Board;

(iv) make available all records to the State Board for inspection;

(v) mark 'Recycled' on lead recovered by reprocessing; and

(vi) create public awareness through advertisements, publications, posters or others with regard to the following:-

(a) hazards of lead; and

(b) obligation of consumers to return used batteries only to the registered dealers or deliver at the designated collection centers.

Procedure for registration/renewal of registration of recyclers

(Rule 9):

(1) Every recycler of used lead acid batteries shall make an application in Form VI along with the following documents to the Joint Secretary, Ministry of Environment and Forests or any officer designated by the Ministry or an agency designated by it for grant of registration or renewal-

(a) a copy of the valid consents under Water (Prevention and Control of Pollution) Act, 1974, as amended and Air (Prevention and Control of Pollution) Act, 1981, as amended;

(b) a copy of the valid authorization under Hazardous Wastes (Management and Handling) Rules, 1989 as amended;

(c) a copy of valid certificate of registration with District Industries Centre; and

(d) a copy of the proof of installed capacity issued by either State Pollution Control Board/District Industries Centre.

(2) Registration application should be disposed by the Ministry of Environment & Forest/any office designated by Ministry/an agency designated by it within 120 days of receipt of completed application.

(3) The registration granted shall be inforce for a period of two years from date of issue or from date of renewal unless suspended or cancelled earlier.

(4) An application for renewal of registration shall be made in Form VI atleast six month before its expiry.

(5) Compliance of condition prescribed in the registration shall be submitted to State Pollution Control Board.

Responsibilities of consumer or bulk consumer

(Rule 10):

(a) consumer :

Ensure that used batteries are not disposed of in any manner other than depositing with the dealer, manufacturer, importer, assembler, registered recycler, reconditioner or at the designated collection centers.

(b) bulk consumer :

(i) Ensure that used batteries are not disposed of in any manner other than by depositing with the dealer/manufacturer/registered recycler/importer/reconditioner or at the designated collection centers, and

(ii) File half-yearly returns in Form VIII to the State Board.

(iii) Bulk consumers or their user units may auction used batteries to registered recyclers only.

Responsibilities of auctioneer

(Rule 11):

(i) Ensure that used batteries are auctioned to the registered recyclers only;

(ii) File half-yearly returns of their auctions to the State Boards in Form IX; and

(iii) Maintain a record of such auctions and make these records available to the State Board for inspection.

Prescribed authority

(Rule 12):

The State Pollution Control Board is the prescribed authority for ensuring compliance to the provisions of these Rules and shall file annual compliance status report to Central Pollution Control Board by 30th April every year.

3.2 NOTIFICATIONS OF MINISTRY OF ENVIRONMENT & FOREST

3.2.1. COASTAL REGULATION ZONE NOTIFICATION, 1991:

Under the provisions of Environment (Protection) Rules, 1986, the Central Government has declared the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (in the landward side) upto 500 meters from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL as Coastal Regulation Zone; and imposes restrictions on the setting up and expansion of industries, operations or processes etc., in the said Coastal Regulation Zone (CRZ).

For the purposes of this notification, the High Tide Line means the line on the land upto which the highest water line reaches during the spring tide. The High Tide Line shall be demarcated uniformly in all parts of the country by the demarcating authority or authorities so authorized by the Central Government, in accordance with the general guidelines issued in this regard.

Note: -The distance from the High Tide Line shall apply to both sides in the case of rivers, creeks and back waters and may be modified on a case by case basis for reasons to be recorded while preparing the Coastal Zone Management Plans. However, this distance shall not be less than 100 meters or the width of the creek, river or backwater whichever is less.

The distance upto which development along rivers, creeks and back-waters is to be regulated shall be governed by the distance upto which the tidal effect of sea is experienced in rivers, creeks or back-waters, as the case may be, and should be clearly identified in the in the Coastal Zone Management Plans

The entire area has been divided into CRZ-I, CRZ-II, CRZ-III and CRZ-IV.

CRZ-I Area:

This zone covers all ecologically sensitive areas such as national parks, marine parks, sanctuaries, reserve forests, wild life habitat, mangroves, corals, coral reefs, areas closed to breeding and spanning grounds of fish and other marine line, areas of outstanding natural beauty/historical/heritage areas, areas rich in genetic diversity, areas likely to be inundated due to rise in sea level consequent upon global warning and such other areas as may be declared by the Central Government or the concerned authorities at the State/Union Territory level from time to time. This zone also covers area between Low Tide Line and High Tide Line.

CRZ-II Area:

The area that have already been developed upto or close to the shoreline. For this purpose, "Developed area" is referred as that area within the municipal limits or in other legally designated urban areas which is already substantially build-up and which has been provided with drainage and approach road and other infrastructural facilities such as water supply and sewerage mains.

CRZ-III Area:

These are areas that are relatively undisturbed and those which do not belong to either CRZ-I and II. These will include coastal zone in the rural areas and also areas within municipal limits or in other legally designated urban areas which are not substantially built-up.

CRZ-VI Area:

Coastal stretches in the Andaman & Nicobar, Lakshadweep and Small Islands except those designated as CRZ-I, CRZ-II or CRZ-III.

3.2.2 ENVIRONMENTAL IMPACT ASSESSMENT NOTIFICATION

(Ministry of Environment and Forests Notification No. S.O. 1533 dtd 14th September, 2006)

The MOEF in exercise of the powers conferred under the Environment (Protection) Act, 1986, and the Environment (Protection) Rules, 1986 has amended the EIA Notification S.O. 60 (E) dated the 27th January, 1994, as per this Notification, it is required that, construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to this notification entailing capacity addition with change in process and or technology shall be undertaken only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment Impact Assessment Authority, in accordance with the procedure specified hereinafter in this notification.

2. Requirements of prior Environmental Clearance (EC):-

- The projects or activities categorized as "A" in the Schedule shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests
- Projects or activities categorized as "B" in the Schedule shall require prior environmental clearance from the State level the State Environment Impact Assessment Authority (SEIAA)
- Expansion and modernization of existing projects or activities listed in the Schedule with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;
- Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

3. State Level Environment Impact Assessment Authority:- (1)

A State Level Environment Impact Assessment Authority shall be constituted by the Central Government under the Environment (Protection) Act, 1986 comprising of three Members including a Chairman and a Member – Secretary to be nominated by the State Government

4. Categorization of projects and activities:-

(i) All projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.

(ii) All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF);

(iii) All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the SEIAA. In the absence of a duly constituted SEIAA or SEAC, a Category 'B' project shall be treated as a Category 'A' project;

5. Screening, Scoping and Appraisal Committees:-

The same Expert Appraisal Committees (EACs) at the Central Government and SEACs hereinafter referred to as the (EAC) and (SEAC) at the State shall screen, scope and appraise projects or activities in Category 'A' and Category 'B' respectively. EAC and SEAC's shall meet at least once every month.

The authorized members of the EAC and SEAC, concerned, may inspect any site(s) connected with the project or activity in respect of which the prior environmental clearance is sought, for the purposes of screening or scoping or appraisal, with prior notice of at least seven days to the applicant, who shall provide necessary facilities for the inspection;

6. Application for Prior Environmental Clearance (EC):-

An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 and Supplementary Form 1A, after the identification of prospective site(s) for the project and/or activities to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant shall furnish, along with the application, a copy of the pre-feasibility project report except that, in case of construction projects or activities (item 8 of the Schedule) in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan shall be provided, instead of the pre-feasibility report.

7. Stages in the Prior Environmental Clearance (EC) Process for New Projects:-

7(i) The environmental clearance process for new projects will comprise of a maximum of four stages, all of which may not apply to particular cases as set forth below in this notification. These four stages in sequential order are:-

- Stage (1) Screening (Only for Category 'B' projects and activities)
- Stage (2) Scoping
- Stage (3) Public Consultation
- Stage (4) Appraisal

I. Stage (1) - Screening:

In case of Category 'B' projects or activities, the concerned SEAC will entail the scrutiny of an application seeking prior environmental clearance made in Form 1 for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project . The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report.

II. Stage (2) - Scoping:

(i) "Scoping": refers to the process by which the Expert Appraisal Committee, determine detailed and comprehensive Terms of Reference (TOR) addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction/Township/Commercial Complexes /Housing) shall not require Scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.

(ii) The Terms of Reference (TOR) shall be conveyed to the applicant by the Expert Appraisal Committee or State Level Expert Appraisal Committee as concerned within sixty days of the receipt of Form 1. In the case of Category A Hydroelectric projects Item 1(c) (i) of the Schedule the Terms of Reference shall be conveyed along with the clearance for pre-construction activities. If the Terms of Reference are not finalized and conveyed to the applicant within sixty days of the receipt of Form 1, the Terms of Reference suggested by the applicant shall be deemed as the final Terms of Reference approved for the EIA studies.

III. Stage (3) - Public Co\nsultation:

(i) "Public Consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category B1 projects or activities shall undertake Public Consultation, except the following:-

(a) Modernization of irrigation projects

(b) All projects or activities located within industrial estates or parks approved by the concerned authorities, and which are not disallowed in such approvals.

(c) Expansion of Roads and Highways which do not involve any further acquisition of land.

(d) All Building /Construction projects/Area Development projects and Townships

(e) All Category 'B2' projects and activities.

(f) All projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government.

(ii) The Public Consultation shall ordinarily have two components comprising of:-

(a) a public hearing at the site or in its close proximity- district wise, to be carried out in the manner prescribed for ascertaining concerns of local affected persons;

(iii) the public hearing at, or in close proximity to, the site(s) in all cases shall be conducted by the State Pollution Control Board (SPCB) in the specified manner and forward the proceedings to the regulatory authority concerned within 45 (forty five) of a request to the effect from the applicant.

(vi) For obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity, the concerned regulatory authority and the State Pollution Control Board (SPCB) shall invite responses from such concerned persons by placing on their website the Summary of EIA report prepared in the prescribed format by the applicant along with a copy of the application in the prescribed form , within seven days of the receipt of a written request for arranging the public hearing . Confidential information including non-disclosable or legally privileged information involving Intellectual Property Right, source specified in the application shall not be placed on the web site. The regulatory authority concerned may also use other appropriate media for ensuring wide publicity about the project or activity. The regulatory authority shall, however, make available on a written request from any concerned person the Draft EIA report for inspection at a notified place during normal office hours till the date of the public hearing. All the responses received as part of this public consultation process shall be forwarded to the applicant through the quickest available means.

(vii) After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation.

IV. Stage (4) - Appraisal:

(i) Appraisal means the detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents like the Final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of environmental clearance. On conclusion of this proceeding, the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned

shall make categorical recommendations to the regulatory authority concerned either for grant of prior environmental clearance on stipulated terms and conditions, or rejection of the application for prior environmental clearance, together with reasons for the same.

(ii) The appraisal of all projects or activities which are not required to undergo public consultation, or submit an Environment Impact Assessment report, shall be carried out on the basis of the prescribed application Form 1 and Form 1A as applicable, any other relevant validated information available and the site visit wherever the same is considered as necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iii) The appraisal of an application be shall be completed by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within sixty days of the receipt of the final Environment Impact Assessment report and other documents or the receipt of Form 1 and Form 1 A, where public consultation is not necessary and the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee shall be placed before the competent authority for a final decision within the next fifteen days .

7(ii). Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects:

All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product –mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance.

8. Grant or Rejection of Prior Environmental Clearance (EC):

(i) The regulatory authority shall consider the recommendations of the EAC or SEAC concerned and convey its decision to the applicant within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned or in other words within one hundred and five days of the receipt of the final Environment Impact Assessment Report, and where Environment Impact Assessment is not required, within one hundred and five days of the receipt of the complete application with requisite documents, except as provided below.

(iii) In the event that the decision of the regulatory authority is not communicated to the applicant within the period specified in sub-paragraphs (i) or (ii) above, as applicable, the applicant may proceed as if the environment clearance sought for has been granted or denied by the regulatory authority in terms of the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iv) The decision of the regulatory authority, and the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be public documents.

(v) Clearances from other regulatory bodies or authorities shall not be required prior to receipt of applications for prior environmental clearance of projects or activities, or screening, or scoping, or appraisal, or decision by the regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to a requirement of law, or for necessary technical reasons

(vi) Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

9. Validity of Environmental Clearance (EC):

- ❖ Ten years in the case of River Valley projects, project life as estimated by Expert Appraisal Committee or State Level Expert Appraisal Committee.
- ❖ Thirty years for mining projects and
- ❖ Five years in the case of all other projects and activities.
- ❖ Area Development projects and Townships, the validity period shall be limited only to such activities as may be the responsibility of the applicant as a developer.

This period of validity may be extended by the regulatory authority concerned by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for Construction projects or activities (item 8 of the Schedule). In this regard the regulatory authority may also consult the Expert Appraisal Committee or State Level Expert Appraisal Committee as the case may be.

10. Post Environmental Clearance Monitoring:

(i) The project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year.

(ii) All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the concerned regulatory authority. The latest such compliance report shall also be displayed on the web site of the concerned regulatory authority.

11. Transferability of Environmental Clearance (EC):

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor, or by the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period..

12. Operation of EIA Notification, 1994, till disposal of pending cases:

From the date of final publication of this notification the Environment Impact Assessment (EIA) notification number S.O.60 (E) dated 27th January, 1994 is superseded, except in suppression of the things done or omitted to be done before such suppression to the extent that in case of all or some types of applications made for prior environmental clearance and pending on the date of final publication of this notification, the Central Government may relax any one or all provisions of this notification except the list of the projects or activities requiring prior environmental clearance in Schedule I, or continue operation of some or all provisions of the said notification, for a period not exceeding one year from the date of issue of this notification.

SCHEDULE

LIST OF PROJECTS OR ACTIVITIES REQUIRING PRIOR ENVIRONMENTAL CLEARANCE

Project or Activity		Category with threshold limit		Conditions if any
		A	B	
1		Mining, extraction of natural resources and power generation (for a specified production capacity)		
(1)	(2)	(3)	(4)	(5)
1 1(a)	Mining of minerals	≥ 50 ha. of mining lease areaAsbestos mining irrespective of mining area	<50 ha ≥5 ha .of mining lease area.	General Condition shall apply Note Mineral prospecting (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey
1(b)	Offshore and onshore oil and gas exploration, development & production	All projects		Note Exploration Surveys (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey
1(c)	River Valley projects	(i) ≥ 50 MW hydroelectric power generation; (ii) ≥ 10,000 ha. of culturable command area	(i) < 50 MW ³ 25 MW hydroelectric power generation; (ii) < 10,000 ha. of culturable command area	General Condition shall apply
1(d)	Thermal Power Plants	≥ 500 MW (coal/lignite/ naphta & gas based); ≥ 50 MW (Pet coke diesel and all other fuels -)	< 500 MW (coal/lignite/ naptha & gas based); <50 MW³ 5MW (Pet coke, diesel and all other fuels)	General Condition shall apply
1(e)	Nuclear power projects and processing of nuclear fuel	All projects	-	
2		**Primary Processing**		
2(a)	Coal washeries	≥ 1 million ton/annum throughput of coal	<1million ton/annum throughput of coal	General Condition shall apply (If located within mining area the proposal shall be appraised together with the mining proposal)

2 (b)	Mineral beneficiation	≥ 0.1million ton/annum mineral throughput	< 0.1million ton/annum mineral throughput	General Condition shall apply (Mining proposal with Mineral beneficiation shall be appraised together for grant of clearance)
3		**Materials Production**		
3(a)	Metallurgical industries (ferrous & non ferrous)	a)Primary metallurgical industry All projects b) Sponge iron manufacturing ≥ 200TPD c) Secondary metallurgical processing industry All toxic and heavy metal producing units ³ 20,000 tonnes /annum -	Sponge iron manufacturing <200TPD Secondary metallurgical processing industry i.) All toxic andheavymetal producing units <20,000 tonnes/ annum ii.)All other non –toxic secondary metallurgical processing industries >5000 tonnes/annum	General Condition shall apply for Sponge iron manufacturing
3(b)	Cement plants	≥ 1.0 million tonnes/annum production capacity	<1.0 million tonnes/annum production capacity. All Stand alone grinding units	General Condition shall apply
4		**Materials Processing**		
4(a)	Petroleum refining industry	All projects	-	-
4(b)	Coke oven plants	≥2,50,000 tonnes/annum- -	<2,50,000 & ≥25,000 tonnes/annum	-
4(c)	Asbestos milling and asbestos based products	All projects	-	-
4(d)	Chlor-alkali industry	≥300 TPD production capacityor a unit located out side the notified industrial area/ estate	<300 TPD production capacity and located within a notified industrial area/ estate	Specific Condition shall apply No new Mercury Cell based plants will be permitted and existing units converting to membrane cell technology are exempted from this Notification
4(e)	Soda ash Industry	All projects	-	-

4(f)	Leather/skin/hide processing industry	New projects outside the industrial area or expansion of existing units out side the industrial area	All new or expansion of projects located within a notified industrial area/ estate	Specific condition shall apply
5		**Manufacturing/Fabrication**		
5(a)	Chemical fertilizers	All projects	-	-
5(b)	Pesticides industry and pesticide specific intermediates (excluding formulations)	All units producing technical grade pesticides	-	-
5(c)	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	All projects-	-	-
5(d)	Manmade fibres manufacturing	Rayon	Others	General Condition shall apply
5(e)	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	Located out side the notified industrial area/ estate-	Located in a notified industrial area/ estate	Specific Condition shall apply
5(f)	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	Located out side the notified industrial area/ estate	Located in a notified industrial area/ estate	Specific Condition shall apply
5(g)	Distilleries	(i)All Molasses based distilleries (ii) All Cane juice/ non molasses based distilleries ≥30 KLD	All Cane juice/non-molasses based distilleries – <30 KLD	General Condition shall apply

5(h)	Integrated paint industry	-	All projects	General Condition shall apply
5(i)	Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp with out bleaching	Pulp manufacturing and Pulp& Paper manufacturing industry -	Paper manufacturing industry without pulp manufacturing	General Condition shall apply
5(j)	Sugar Industry	-	≥ 5000 tcd cane crushing capacity	General Condition shall apply
5(k)	Induction/arc furnaces/cupola furnaces 5TPH or more	-	All projects	General Condition shall apply
6		**Service Sectors**		
6(a)	Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks /sanctuaries/ coral reefs / ecologically sensitive areas including LNG Terminal	All projects -		-
6(b)	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	-	All projects	General Condition shall apply
7		**Physical Infrastructure including Environmental Services**		
7(a)	Air ports	All projects	-	-
7(b)	All ship breaking yards including ship breaking units	All projects	-	-

7(c)	Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.	If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area. Industrial estates with area greater than 500 ha. and housing at least one Category B industry.	-Industrial estates housing at least one Category B industry and area <500 ha. Industrial estates of area> 500 ha. and not housing any industry belonging to Category A or B.	Special condition shall apply Note: Industrial Estate of area below 500 ha. and not housing any industry of category A or B does not require clearance.
7(d)	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	All integrated facilities having incineration & landfill or incineration alone	All facilities having land fill only	General Condition shall apply
7(e)	Ports, Harbours	≥ 5 million TPA of cargo handling capacity (excluding fishing harbours)	< 5 million TPA of cargo handling capacity and/ orports/ harbours ≥10,000 TPA of fish handling capacity	General Condition shall apply
7(f)	Highways	i) New National High ways; and	i) New State High ways; and	General Condition shall apply
		ii) Expansion of National High ways greater than 30 KM, involving additional right of way greater than 20m involving land acquisition and passing through more than one State.	ii) Expansion of National / State Highways greater than 30 km involving additional right of way greater than 20m involving land acquisition.	
7(g)	Aerial ropeways		All projects	General Condition shall apply
7(h)	Common Effluent Treatment Plants (CETPs)		All projects	General Condition shall apply
7(i)	Common Municipal Solid Waste Management Facility (CMSWMF)		All projects	General Condition shall apply
8		**Building /Construction projects/Area Development projects and Townships**		
8(a)	Building and Construction projects		≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#	#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)
8(b)	Townships and Area Development projects.		Covering an area ≥ 50 ha and or built up area ≥1,50,000 sq .mtrs ++	++All projects under Item 8(b) shall be appraised as Category B1

Note:-

General Condition (GC):

Any project or activity specified in Category 'B' will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) inter-State boundaries and international boundaries.

Specific Condition (SC):

If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre –defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate).

3.2.3 USE OF FLY ASH, BOTTOM ASH OR POND ASH IN THE MANUFACTURE OF BRICKS AND OTHER CONSTRUCTION ACTIVITIES

(MoEF notification No. S.O. 763(E) dt. 14.9.1999 and S.O. 979 (E) dt. 27/8/2003)

Objective:

To protect the environment, conserve top soil and prevent the dumping and disposal of fly ash discharged from coal or lignite based thermal power plants;

And, for restricting the excavation of top soil for manufacture of bricks and promoting the utilization of fly ash in the manufacture of building materials and in construction activity within a radius of 100 kilometers from coal or lignite based thermal power plants.

Salient features:

(1) Use of fly ash, bottom ash or pond ash in the manufacture of bricks and other construction activities.

No person shall within a radius of hundred kilometers from coal or lignite based thermal power plants, manufacture clay bricks or tiles or blocks for use in construction activities without mixing atleast 25 percent of ash (fly ash, bottom ash or pond ash) with soil on weight to weight basis.

"1(A) Every construction agency such as Housing Board and those in private sector building of apartments, hotels, resorts and cottages and other likes engaged in the construction of buildings within a radius of fifty to one hundred kilometers from a coal or lignite based thermal plant shall use fly ash bricks or blocks or tiles or clay fly ash bricks or cement fly ash bricks or blocks or similar products or a combination or aggregate of them in such construction as per the following minimum percentage (by volume) of the total bricks, blocks and tiles, as the case may be, used in each construction project, namely

(i) 25 percent by 31st August 2004;

(ii) 50 percent by 31st August 2005;

(iii) 75 percent by 31st August, 2006; and

(iv) 100 percent by 31st August 2007.

In respect of construction of building within a radius of 50 kilometers from a coal or lignite based thermal power plant 100 percentage (by volume) fly ash bricks, blocks and tiles shall be used.

(2) The authority for ensuring the use of specified quantity of ash as per sub-paragraph (1) shall be the concerned Regional Officer of the State Pollution Control Board.

(2A) The concerned State Government shall be the enforcing and monitoring authority for ensuring compliance of the provisions of sub-paragraph (1A)".

(3) In case of non availability of fly ash from thermal power plant in sufficient quantities the applicability of paragraph (1) shall be suitably modified by State Government.

(4) In case of non compliance by brick kilns the consent order will be cancelled and moved to the district administration for cancellation of mining lease. Also, further consents will not be granted.

(5) Coal or lignite based thermal power plant shall constitute a dispute settlement committee which includes the General Manager of the thermal power plant and a

representative of All India Brick and Tile Manufacturers Federation and brick kiln owners association.

(6) (a) Construction of roads or flyover embankment by Ministry of Road Transport and Highway, National Highway Authority, P.W.D and C.P.W.D. shall be in accordance with guidelines issued by Indian Road Congress (IRC).Any deviation from this direction can only be agreed to on technical reasons if the same is approved by Chief Engineer (Design) or Engineer in Chief with a certificate that "Pond ash not available" from thermal power plant within 100 kilometers radius.

(b) The above mentioned, shall also make provision in tender document, schedule of approved materials and rates as well as technical documents, including those relating to soil borrow area or pits.

(c) To make necessary specification/guidelines for road or flyover embankments that are not covered by IRC.

(7) Soil required for top or side covers of embankments of roads or flyover, shall be excavated from the embankment site and if it is not possible to do so, only minimum quantity shall be excavated, storing the top soil separately and after the excavation to the side shall be filled with fly ash with proper compaction and covered with top soil kept separately.

(8) Only Fly ash shall be used to reclaim low lying area with proper compaction.

(9) State Government agency and CPWD shall include in the schedule of specification, the provisions of fly ash and fly ash based products.

Responsibility of Thermal Power plants:

(1) Thermal Power Plants shall make available the fair quality of fly ash for the purpose of manufacturing ash based brick products such as, cement, concrete blocks, bricks, panels or a combination thereof for construction activity such as road embankments, dams, dykes or any other construction activity, for at least 10 years from the date of publication of the notification(14.9.1999).

(2) Reclamation of sea shall be permissible method of utilization of fly ash.

(3) Thermal power plants within a period of 15 years of Notification (14/9/1999) shall phase out the utilization of fly ash in accordance with an action plan such that the entire fly ash is utilized subsequently.

(4) Thermal power plants shall submit the action plan to CPCB, SPCB and concerned Regional Offices of MoEF.

(5) The Central and State Government Agencies, the State Electricity Boards, the National Thermal Power Corporation and the management of the thermal power plants shall facilitate in making available land, electricity and water for manufacturing activities and provide access to the ash lifting area for promoting and setting up of ash-based production units in the proximity of the area where ash is generated by the power plant.

Specification for use of ash-based products

Manufacture of ash-based products such as cement, concrete blocks, bricks, panels or any other material or the use of ash in construction activity such as in road laying, embankments or use as landfill to reclaim low lying areas including back filling in abandoned mines or pitheads or for any other use shall be carried out in accordance with specifications and guidelines laid down by the Bureau of Indian Standards, Indian Bureau of Mines, Indian Road Congress, Central Building Research Institute, Roorkee, Central Road Research Institute, New, Delhi, Building Materials and Technology Promotion Council, New Delhi, Central Public Works Department, State Public Works Departments and other Central and State Government agencies.

The Central Public Works Department, Public Works Departments in the State/Union Territory Governments, Development Authorities, Housing Boards, National Highway Authority of India and other construction agencies including those in the private sector shall also prescribe the use of ash and ash-based products in their respective schedules specifications and construction codes of practice, within a period of four months from the publication of this notification.

All local authorities shall specify in their respective building bye-laws and regulations the use of ash and ash-based products and construction techniques in building materials, roads, embankments or for any other use within a period of four months from the date of publication of this notification.

3.2.4. SCHEME FOR LABELLING OF ENVIRONMENTAL FRIENDLY PRODUCTS

The Government have resolved vide Resolution No.GSR 85(E) dated 20.2.1991 to institute a Scheme on Labeling of Environment Friendly Products. The scheme will operate on a national basis and provide accreditation and labeling for household and other consumer products which meet certain environmental criteria along with quality requirements of the Indian Standards for that product. The Label shall be known as the "ECOMARK" and will be of the design to be notified.

Any product which is made, used or disposed of in a way that significantly reduces the harm it would otherwise cause the environment could be considered as Environment Friendly Product.

Objective of the scheme:

The specific objectives of the scheme are as follows:

(i) To provide an incentive for manufacturers and importers to reduce adverse environmental impact of products.

(ii) To reward genuine initiatives by companies to reduce adverse environmental impact of their products.

(iii) To assist consumers to become environmentally responsible in their daily lives by providing information to take account of environmental factors in their purchase decisions.

(iv) To encourage citizens to purchase products which have less harmful environmental impacts.

(v) Ultimately to improve the quality of the environment and to encourage the sustainable management of resources.

Administrative and organizational structure:

There will be three stages leading to the award of the "ECOMARK":-

(a) A Steering committee, set up in the Ministry of Environment and Forests, to determine the product categories for coverage under the scheme and also formulate strategies for promotion, implementation, future development and improvements in the working of the scheme.

(b) A technical committee, set up in the Central Pollution Control Board, to identify the specific product to be selected and individual criteria to be adopted, including, wherever possible, inter-se priority between the criteria if there be more than one.

(c) The Bureau of Indian Standards to assess and certify the products and draw up a contract with the manufacturers, allowing the use of the label, on payment of a fee.

Certification and licensing:

(a) Under the scheme, the manufacturers shall apply for testing and certification of products which fall under the notified categories in terms of their compliance with published environmental criteria in the prescribed form. The terms and conditions governing operation of licenses including fees shall be as per the Bureau of Indian Standards Act and the regulations framed thereunder.

(b) Testing and certification shall be carried out by the Bureau of Indian Standards. For product categories which have the Indian Standards mark, the Bureau of Indian Standards will ordinarily complete the task of certification within a period of three months. Products certified as eligible for the ECOMARK shall be licensed to carry the ECOMARK for a prescribed time period.

(c) The product shall be reassessed after the prescribed period and the license fee shall have to be paid again for the mark.

The criteria for Ecomark:

Environmental criteria for each product category will be notified by the Central Government and later on shall be translated into Indian Standards by the Bureau of Indian Standards. The criteria shall be for broad environmental levels and aspects, but will be specific at the product level. Products will be examined in terms of the following main environmental impacts:-

(a) That they have substantially less potential for pollution than other comparable products in production, usage and disposal.

(b) That they are recycled, recyclable, made from recycled products or biodegradable, where comparable products are not.

(c) That they make significant contribution to saving non-renewable resources, including non-renewable energy sources and natural resources, compared with comparable products.

(d) That the product must contribute to a reduction of the adverse primary criteria which has the highest environmental impact associated with the use of the product, and which will be specifically set for each of the product categories.

In determining the primary criteria for a product, the following shall be taken into account:-

(a) Production process including source of raw material;

(b) Case of Natural Resources;

(c) Likely impact on the environment;

(d) Energy conservation in the production of the product;

(e) Effect & extent of waste arising from the production process;

(f) Disposal of the product and its container;

(g) Utilization of "Waste" and recycled materials;

(h) Suitability for recycling or packaging:

(i) Biodegradability.

The criteria shall be reviewed from time to time. The draft criteria shall be released for public comments for a period of sixty days.

Period of award:

The label shall be awarded for a minimum period of one year and shall roll forward annually. The Bureau of Indian Standards have the powers to withdraw the licence at any time if they find any misleading information. The award may also be withdrawn in case of any change in criteria due to the advancement of technology or any other valid reasons, in consultation with the technical committee. The time period of the award may be reviewed from time to time.

The Logo

The Logo for the "ECOMARK" shall be as notified by the Central Government.

3.2.5 UNIFORM PROTOCOL ON WATER QUALITY MONITORING ORDER 2005.

(MOEF notification No.S.O. 2151. dated:17-6-2005).

Application

It shall apply to all organizations, agencies and any other body monitoring surface and ground water quality for observance of uniform protocol on water quality monitoring.

Definitions

- **"Baseline Stations"** means the monitoring location where there is no influence of human activities on water quality;
- **"Flux Stations or Impact Stations"** means the location for measuring the mass of particular pollutant on main river stem for measuring the extent of pollution due to human interference or geological feature at any point of time and is necessary for measuring impact of pollution control measures adopted;
- **"Trend Station"** means the monitoring location designed to show how a particular point on a watercourse varies over time due, normally, to the influence of man's activities;

Monitoring Station and Frequency of Sampling.

(I) The frequency of sampling in respect of surface water shall be as follows:-

(a) All the stations shall be a combination of Baseline, Trend and Flux or Impact stations.

(b) The Baseline stations shall be monitored four times a year for perennial rivers and lakes and three to four times a year for seasonal rivers. Trend stations shall be monitored with an increased frequency of once in a month i.e. twelve times in a year. Flux or Impact stations shall be monitored twelve to twenty-four times in a year depending upon pollution potential or importance of water use.

(c) All agencies shall follow the sampling frequency and parameters for analysis of surface water as mentioned in the Table-I given below:-

Table-I

Frequencies and parameters for analysis of surface water samples

Type of Station	Frequency	Parameters
Baseline	Perennial rivers and Lakes: Four times a year (seasonal) Seasonal rivers: 3-4 times (at equal spacing) during flow period Lake: 4 times a year (seasonal)	(A) pre monsoon Once a year Analyse 25 parameters as listed below: (a) General: Colour, odour, temperature, pH, electrical Conductivity (EC), Dissolved Oxygen (DO), Turbidity, Total Dissolved Solid (TDS) (b)Nutrients: Ammonical Nitrogen (NH_4-N), Nitrite & Nitrate Nitrogen (NO_2 + NO_4) Total Phosphate (Total P) (c) Demand parameters: Biological Oxygen Demand (BOD) Chemical Oxygen Demand (COD).

		(d) Major ions: Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Carbonate (CO_3) Bicarbonate (HCO_4), Chloride (Cl), Sulphate (SO_4) (e) Other inorganic: Fluoride (F), Boron (B) and other location specific parameter, if any (f) Microbiological: Total coliform and Faecal Coliform (B) Rest of the year (after the pre-monsoon sampling) at every three months interval. Analyse 10 parameters: Colour, Odour, Temperature, pH, EC, DO, NO_2 + NO_3, BOD, Total coliform and Faecal Coliform
Trend or Impact or Flux:	Once every month starting April-May (pre-monsoon), i.e. 12 times a year	(A) Pre-monsoon: Analyse 25 parameters as listed for baseline monitoring. (B) Other months: Analyse 15 parameters as listed below (a) General: Colour, Odour, Temp. pH, EC, DO and Turbidity (b) Nutrients: NH_4-N, NO_2 + NO_4, Total P (c) Organic Matter: BOD, COD (e) Major ions: Cl (d) Microbiological: Total and Faecal coliforms (C) Micropollutant: Once in a year/pre monsoon (i) Pesticides-Alpha Benzenehexachloride (BHC), Beta BHC, Gama BHC (Lindane), Op-Dichlorodiphenylmchoroethane (CP-DDT), PP-DDT. Alpha Endosulphan, Beta Endosulphan, Aldrin, Dieldm, Carbaryl (Carbamate). Malathian, Methyl Parathian, Anilophos, Chloropyriphos (ii) Toxic Metals-Arsenic (As), Cadmium (Cd), Mercury (Hg), Zinc (Zn), Chromium (Cr), Lead (Pb), Nickel (Ni), Iron (Fe) (The parameters may be selected based on local need)

Note:

(i) The parameters mentioned in the above Table shall be the minimal requirement. This does not, however, restrict analysis of more parameters depending upon the specific requirements of the analyzing agency and its manpower availability.

(ii) For lakes or reservoirs, monitoring of additional parameters, like total Kjeldhal Nitrogen, Chlorophyll, total Plankton count and productivity, shall be included in the list of parameters.

(iii) If biomonitoring is done in river or lakes or reservoirs, additional specific parameters are to be considered.

2. Ground Water

The frequency of sampling in respect of ground water shall be as follows:

(a) all stations shall be classified as Baseline stations.

(b) 20-25% of Baseline stations shall be classified as Trend stations where there is a perceived problem.

(c) All agencies shall follow the sampling frequency and parameters for analysis of ground water as mentioned in the Table given below:-

Frequencies and Parameters for analysis of Ground Water Samples

Type of Station	Frequency	Parameters
Baseline	Twice a year (Pre and Post monsoon)	(A) Pre and Post Monsoon Season: Analyse 20 parameters as listed below:- (a) General: Colour, odour, temperature, season) pH, EC, TDS (b) Nutrients: NO_2 + NO_3, orthophosphate (c) Demand Parameter: COD (d) Major Ions: Na+, K+, Ca++,CO_3-, HCO_3-, Cl-,SO_4-%Na & SAR (e) Other Inorganics: F, B and other location-specific parameter, if any.
Trend	Twice a year (Pre and Post monsoon)	(A) April-May" Analyse 20 parameters as listed for Baseline monitoring (B) Other times: Analyse 14 parameters as listed below:- (I) General: Colour, odour, temp, EC, pH, TDS %Na & SAR (a) Nutrients: NO_2+NO_3, orthophosphate (b) Demand Parameter COD (c) Major ions CL^- (d) Other inorganics F.B. (e) Microbiological Total coliform and fecal coliform (C) Micropollutant (parameters may be selected based on local need): (2) Pesticides: Alpha BHC, Beta BHC, Gama BHC (Lindane), OP-DDT, PP-DDT, Alpha Endosulphan, Beta Endosulphan, Aldrin, Dieldrin, 2, 4-D, Carbaryl Malathian, Methyl, Parathian, Anilphos, (Carbamate), Chloropyriphos. (3) Toxic Metals-As, Cd, Hg, Zn, Cr, Pb, Ni, Fe (Pesticides and Toxic metals may be analysed once a year in pre monsoon selected locations)

Note:

(i) The parameters mentioned in the above Table shall be the minimal requirement. This does not, however, restrict analysis of more parameters depending upon the specific requirements of the analyzing agency and its manpower availability.

(ii) If Chemical Oxygen Demand (COD) value exceeds 20 mg/l, the sample shall be analysed for Biochemical Oxygen Demand (BOD) also.

5. Sample Collection

(1) The procedure for sample collection in respect of surface water shall be as under:

(a) Samples for Baseline and Trend stations shall be collected from well-mixed section of the river or main stem 30 cm below the water surface using a Dissolved Oxygen (DO) sampler or weighted bottle.

(b) Samples for Impact stations shall be collected from the point of interest, such as bathing ghat, down stream of point discharge, water supply intakes and other sources.

(c) The Dissolved Oxygen (DO) in the sample shall be fixed immediately after collection and Dissolved Oxygen (DO) analysis shall be done either in the field or in laboratory.

(2) The procedure for sample collection in respect of ground water shall be as under:

(a) Open dug wells, which are not in use or have been abandoned, shall not be considered as water quality monitoring station. However, such well could be considered for water level monitoring.

(b) Weighted sample bottle to collect sample from an open well about 30 cm below the surface of water may be used. The plastic bucket, which is likely to skim the surface layer only, shall not be used.

(c) Samples from the production tube wells shall be collected after running the well for about five minutes.

(d) Non-production piezometers shall be purged using a submersible pump. The purged water volume shall equal 4 to 5 times the standing water volume before sample is collected.

(e) For bacteriological samples, when collected from tube wells or hand pump, the spout or outlet of the pump shall be sterilized under flame by spirit lamp before collection of sample in container.

6. Sample preservation and transportation

(1) The type of containers and sample preservation to be adopted shall be as mentioned in the below:

Parameter	Container	Preservation
General	Glass, PE	4^0C, dark
BOD	Glass, PE	4^0C, dark
COD, NH_3, NO_2, NO_3	Glass, PE	H_2SO_4, PH<2
Coliform	Glass, PE, Sterlised	4^0C, dark
DO	BOD bottle	DO fixing chemicals
Fluoride	PE	None
P	Glass	None
Pesticides	Glass, Teflon	4^0C, dark
Toxic metals	Glass, PE	HNO_3, PH<2

(2) Samples shall be transported to concerned laboratory as soon as possible, preferably within forty-eight hours of collection.

(3) Analysis for coliforms shall be started within twenty-four hours of collection of sample. If time is exceeded, it should be recorded with the result.

(4) Samples containing micrograms/l metal level should be stored at 4°C and analysed as soon as possible. If the concentration is of mg/l level, it can be stored for up to 6 months, except mercury, for which the limit is 5 weeks.

(5) Sample identification for the water sample analysis for surface and ground water samples shall be as mentioned in the Form-I and Form-II.

7. Sample records

(1) Each laboratory shall have a bound register, which shall be used for registering samples as they are received. A format for sample receipt register is shown in Form-III.

(2) The Laboratory Incharge shall maintain a register for assignment of work to specific analyst.

8. Analytical techniques

Each agency shall follow analytical techniques prescribed in the Standards Methods for Analysis of Water and Wastewater published by American Public Health Association (Latest Edition) or Bureau of Indian Standards (BIS) Methods for Testing Water and Wastewater-methods of sampling and testing (physical and chemical) (IS:3025)

9. Analysis records and data validation

A recommended format for recording data including all parameters except toxic metals and trace organics is enclosed as Form-IV. Report of heavy metals and trace organics as per Table 2 may be recorded separately. Validation checks should be performed in the laboratory on completion of the analysis. The results of laboratory analyses shall be entered in the format provided in Form-II for validation.

10. Quality Assurance and Accreditation of Laboratories

The Quality Assurance Programme for the laboratories of various agencies shall contain a set of operating principles, written down and agreed upon by the organization, delineating specific functions and responsibilities of each person involved. Each laboratory of water quality monitoring agencies shall follow the guidelines of Quality Assurance Programme prescribed by their respective Central Laboratory or Headquarters and shall participate in Inter Laboratory Quality Assurance Programme like Proficiency Testing (PT) organized by them or any other agency on regular basis. The Water Quality Laboratories shall seek recognition from the Ministry of Environment and Forests, Government of India or accreditation from National Accreditation Board for Testing and Calibration Laboratories (NABL) under the Ministry of Science and Technology, Government of India.

FORM-I

Sample identification for surface water samples analysis and record.

Sample Code											
Observer	Agency						Project				
Date Time	Station Code										
Parameter code	Container				Preservation				Treatment		
	Glass	PVC	PE	Teflon	None	Cool	Acid	Other	None	Decant	Filter
(1) General											
(2) Bacteriology											
(3) BOD											
(4) COD, NH3, NO3											
(5) Toxic Metals											
(6) Trace											
Organics											

	Source of sample			
Water	Point	Approach	Medium	Matrix
0 River	0 Main current	0 Bridge	0 Water	0 Fresh
0 Drain	0 Right bank	0 Boat	0 Suspended matter	0 Brackish
0 Canal	0 Left bank	0 Wading	0 Biota	0 Salt
0 Reservoir (lake/tank/pond)			0 Sediment	0 Effluent
Sample type	0 Grab 0 Time-comp 0 Flow-comp 0 Depth-integ 0 Width-integ			
Sample device	0 Weighted bottle 0 Pump 0 Depth sampler			

Field determinations			
Temp ^{0}C	pH	EC micromhos/cm	DO mg/l
Odour Code	(1) Odour free (6) Septic	Colour Code	(1) Light brown (6) Dark
	(2) Rotten eggs (7) Aromatic		green
	(3) Burnt sugar (8) Chlorinous		(2) Brown (7) Clear
	(4) Soapy (9) Alcoholic		(3) Dark brown (8) other
	(5) Fishy (10) Unpleasant		(4) Light green (specify) (5) Green

Remarks	
Weather	0 Sunny 0 Cloudy 0 Rainy 0 Windy
Water vel. M/s	0 High(>0.5) 0 Medium (0.1-0.5) 0 Low (<0.1) 0 Standing
Water use	0 None 0 cultivation 0Bathing& washing 0 Cattle washing
	0 Melon/vegetable farming in riverbed. 0 organized water supply

FORM - II

Sample identification for ground water samples

Sample Code											
Observer	Agency						Project				
Date	Time						Station Code				
Source of sample	O open dug well			O Handpump			O Tube well			O Prezometer	
Parameter code	Container				Preservation				Treatment		
	Glass	PVC	PE	Teflon	None	Cool	Acid	Other	None	Decant	Filter
(1) General											
(2) Bacteriology											
(3) BOD											
(4) COD, NH_3, NO_3											
(5) Toxic Metals											
(6) Trace Organics											

Field determinations			
Temp ^0C	pH	EC micromhos/cm	DO mg/l
Odour Code	(1) Odour free (6) Septic (2) Rotten eggs (7) Aromatic (3) Burnt sugar (8) Chlorinous (4) Soapy (9) Alcoholic (5) Fishy (10) Unpleasant	Colour Code	(1) Light brown (6) Dark green (2) Brown (7) Clear (3) Dark brown (8) Other (4) Light green (9) other (specify) (5) Green

IF, WELL IS PURGED, COMPLETE BELOW:-			
Office Well Data			
Diameter	Q		cm
Depth	D		m
Static water level (avg)	SWL		m
Water column (D-SWL)	H		m
Initial volume well	V		L
Projected pump discharge	PQ		L/s
Projected time of purging (V/PQ)	PT		min
Field Flow Measurement			
Static water level on arrival	SWL		M
Actual pump setting			m
Purging duration			Min
Pump Discharge before sampling	Q		L/min
Pump Discharge after sampling	Q		L/min
Volume purged	V		L
Dynamic water level	DWL		M
Field Chemical Measurement			
Time at start of sampling started	T(^0C)		EC micromhos/cm pH
+ 10 mm			
+20 mm			
+ 30 mm			
+ 40 mm			

FORM-III

Sample Record for Analysis

Date/Time received at lab	Date/Time Collected	Station code	Project	Colleting agency/ collector	Pre-servation	Parameter Code	Lab Sample No.
1	2	3	4	5	6	7	8

Sample receipt register

Note:

- Column 3 gives the station code conventionally followed by the monitoring agency.
- Column (4) gives the project under which the sample is collected.
- Column (7) corresponds to the parameter (s) code given in the sample identification form.
- Column (8) gives the laboratory sample assigned to the sample as it is received in the laboratory. Note that the numbering has two parts separated by a hyphen. The first part is assigned in a sequential manner as samples are received from various stations. If two samples are collected at the same time from a station for different sets of analysis, the first part of the number is the same. The second part corresponds to the parameter code as given in the sample.
- The results of the analysis of all the samples having the same first part of the code would be entered in the data entry system as one sample having the same station code and time of sample collection.

Collection and preservation of samples

The objective of sampling is to collect a portion of material small enough in volume to be transported conveniently and handled in the laboratory.

Precautions:

- In water and wastewater sampling before filling the sample bottle, rinse it two or three times with water/wastewater being collected. For analysis of organic compound, fill the container full or leave space for aeration, mixing, etc., for biological analysis.
- If preservative is used, take care not to over-fill the bottle, as preservative may be lost or diluted.
- When volatile organic compound containing effluent is sampled, approximately one percent of the container volume should be left for thermal expansion.
- Make a record of every sample collected and identify every bottle by attaching a tag or label. Record the date of collection, location, temperature, etc.
- Before collecting the samples from distribution system, flush lines with 3 to 5 pipe volume to ensure representative sampling.

- ❖ While collecting samples from wells, ensure the water is pumped sufficiently from the ground source and then collect the samples.
- ❖ When samples are collected from a river or stream, take an integrated sample from top to bottom in the middle of the main channel of the stream or from the side to side at mid-depth. If only a grab or catch sample is collected, collect it from the middle of the main channel at mid-depth.
- ❖ Lakes and rivers are subjected to considerable variation with season. Choose locations and depth of sampling point depending on the local condition.
- ❖ Avoid areas of turbulence, sampling at weirs, dead pockets, etc.
- ❖ Collect the sample beneath the surface in quiescent areas and open sampling container below surface to avoid collecting the surface scum.
- ❖ Observe safety precautions while collecting toxic samples

Types of Samples:

(a) Grab or catch sample:

A sample collected at particular time and place can represent only the composition of the source at that time and place. However, when a source is known to be relatively constant in composition over an extended period of time or over substantial distance in all directions, then the sample may be set to represent a longer time period or a larger volume, or both, than the specific time and place at which it is collected. In such circumstances, a source may be represented adequately by single grab sample.

(b) Composite Sample or time composite sample:

It refers to a combination of grab samples collected at the same sampling point at different times. It is most useful for observing average concentrations used in calculating variables as the loading or the efficiency of the waste treatment plant.

It is an alternative to separate analysis of large number of samples and computation of average and total results. 24 hour period of sampling is considered standard for most determinations. To evaluate variables or irregular discharges, composite sampling is required during such variations/ irregular discharges.

Collect individual portions in a wide mouth bottles at regular intervals and mix it at the end of sampling period or combine in a single bottle. It is desirable to combine individual samples in volumes proportional to flow. A final sample volume of 2 to 3 liters is sufficient for analysis.

(c) Integrated Sample:

For certain purposes, the information needed is provided by analyzing mixtures of grab samples collected from different points simultaneously. e.g. river or stream sampling, combined treatment of different waste before treatment to know the effect on treatability or its composition.

For integrated sampling, it requires equipment to collect sample from known depth without contaminating with over-laying water.

Preservation of Samples:

Parameter	Minimum sample size, ml	Preservation §	Maximum storage recommended
Acidity	100	Refrigerate	24h
Alkalinity	200	Refrigerate	24h
BOD	1000	Refrigerate	6h
Boron	100	None required	28 d
Bromide	100	None required	28 d
Carbon, organic, total	100	Analyze immediately; or refrigerate and add H_3PO_4 or H_2SO_4 to pH<2	7 d
Carbon dioxide	100	Analyze immediately	Stat
COD	100	Analyze as soon as possible, or add H_2SO_4 to pH<2; refrigerate	7 d
Chloride	50	Non required	28 d
Chlorine, residual	500	Analyze immediately	0.5 h
Chlorine dioxide	500	Analyze immediately	0.5 h
Chlorophyll	500	30 D in dark	30 d
Color	500	Refrigerate	48 h
Conductivity	500	Refrigerate	28 d
Cyanide: Total	500	Add NaOH to pH>2, refrigerate in dark	24 h
Amenable to chlorination	500	Add 100 mg $Na_2S_2O_3$/L	Stat
Fluoride	300	Non required	28 d
Hardness	100	Add HNO_3 to pH<2	6 months
Iodine	500	Analyze immediately	0.5 h
Metals, general	500	For dissolved metals filter immediately, add HNO_3, to pH<2	6 months
Chromium Hexavalent	300	Refrigerate	24 h
Mercury	500	Add HNO_3 to pH<2, 4°C, refrigerate	28 d
Nitrogen: Ammonia	500	Analyze as soon as possible or add H_2SO_4 to pH<2, refrigerate	7 d

Nitrate	100	Analyze as soon as possible or refrigerate	48 h
Nitrate + nitrite	200	Add H_2SO_4 to pH<2, refrigerate	none
Nitrite	100	Analyze as soon as possible or refrigerate	None
Organic, Kjeldhal	500	Refrigerate; add H_2SO_4 to pH<2	7 d
Odour	500	Analyze as soon as possible; refrigerate	6 h
Oil and grease	1000	Add HCl to pH<2, refrigerate	28 d
Organic compounds: MBAS	250	Refrigerate	48 h
Pesticides	1000	Refrigerate; add 1000 mg ascorbic acid/L if residual chlorine present	7 d
Phenols	500	Refrigerate, add H_2SO_4 to pH<2	28 d
Purgeables by purge and Trap	2 x 40	Refrigerate; add HCL to pH<2; add 1000 mg ascorbic acid/L if residual chlorine present	7 d
Oxygen, dissolved: Electrode	300	Analyze immediately	0.5 h
Winkler		Titration may be delayed after acidification	8 h
Ozone	1000	Analyze immediately	0.5 h
pH	50	Analyze immediately	2 h
Phosphate	100	For dissolved phosphate filter immediately; refrigerate	48 h
Salinity	240	Analyze immediately	6 months
Silica	200	Refrigerate, do not freeze	28 d
Sludge digester gas	-	-	N.S.
Solids	200	Refrigerate	7 d
Sulfate	100	Refrigerate	28 d

Sulfide	100	Refrigerate; add 4 drop 2N zinc acetate/100ml; add NaOH to pH>9	28 d
Taste	500	Analyze as soon as possible; refrigerate	24 h
Temperature		Analyze immediately	stat
Turbidity	100	Analyze same day; Store in dark upto 24 h, refrigerate	24 h

§ Refrigerate = storage at 4^0C, in the dark.

stat No storage allowed; analyze immediately.

N.S. Not stated in cited reference.

3.3. NOTIFICATIONS ISSUED BY GOVERNMENT OF KARNATAKA

3.3.1 ENVIRONMENT CLEARANCE BY STATE ENVIRONMENT CLEARANCE COMMITTEE

(Government Order No. FEE 14 ENV 2000, dated 31.12.2001, No. FEE 14 ENV 2000(p) dated: 21.08.2003, No.FEE 14 ENV 2004, dated 16.1.2004 & No. FEE 129 ECO 2004 dated 4.8.2005)

The State Environment Clearance Committee (SECC) to function at the State Level.

The SECC scrutinize projects as listed below:

(i) **Irrespective of location**

(a) Project below investment levels of Rs.100 Crores but above Rs.5 Crores for new projects and indicated in Annexure-I of this Government Order. These lists will be subject to the amendments issued by the Ministry of Environment and Forest, government of India from time to time.

(b) Projects below investment levels of Rs.50Crores for expansion/modernization projects but above Rs.5 Crores and indicated in Annexure-I to the Government Order. These lists will be subject to the amendments issued by the Ministry of Environment and Forest, Government of India from time to time.

(ii) Modernization project in irrigation sector if additional command area is less than 10,000 hectares or project cost is less than Rs.100 Crores.

(iii) Project which fall under the Red Category with an investment of more than Rs.5 Crores, This list will be subject to the amendments issued by the KSPCB from time to time.

Site/Environmental Clearance in Mining

A. Site Clearance

Site clearance is mandatory for projects involving prospecting and exploration of major minerals in areas above 500 ha and (ii) Mining (major minerals) in areas above 5 ha from Ministry of Environment and Forests Government of India. However, no prior site clearance is required for projects involving prospecting and exploration of major minerals in areas above 500 ha provided it is for test drilling on a scale not exceeding 5 boreholes per 100 sq. km. The application seeking site clearance as prescribed in schedule II of the EIA notification shall be routed through Department of Mines and Geology for consideration. Public Hearing is not required for obtaining site clearance.

Further all Industrial Areas/Estates, Special Economic Zones, henceforth set up in the private, cooperative or public bodies/sector will require to conduct a comprehensive Environment Impact Assessment (EIA) study, and will come under the purview of the SECC. The EIA study will be conducted in accordance with the guidelines of the MoEF. The Department of Commerce and Industries, through KIADB and in interaction with the private entrepreneurs, will also take steps to provide for treatment and disposal system in respect of solid waste, trade effluent, hazardous and toxic chemicals in all existing and future Industrial Area/Estates as per the proceedings of the meeting held by the Additional Chief Secretary and Principal Secretary to Government, Commerce and Industries Department on 27.11.2001

Procedure for obtaining ECC from State Government

The industry/project seeking environment clearance shall submit an application in the prescribed proforma along with the prescribed documents to the Department of Environment & Ecology before starting the work on the new/expansion/diversification/modernization project.

In the case of units using hazardous chemical ands substances as per the Hazardous waste (Management and Handling) Rules, 1989, a risk analysis report and on-site disaster management plan would additionally be considered essential.

The entrepreneur will apply for environment clearance only after Consent for Establishment has been issued by the KSPCB. Till environmental clearance is received, no construction work relating to the setting up of the industry shall be undertaken. Violation of the above condition will attract the provisions of Section 5 of the Environment (Protection) Act, 1986 and delegated to the State Government as per MoEF Notification No.SO. 152(E) dated

10.2.88. KPSCB will not issue Consent for Operation till the entrepreneur has received environment clearance from the SECC.

Annexure-I

Project requiring environment clearance from Government of India if investment is more than Rs.100 crores and projects investment levels of more than Rs.50.00 crores for expansion/modernization. State Environment Clearance Committee of the Government of Karnataka would consider if the investment is less than Rs.100 crores and more than Rs.5 crores and projects of investment level between Rs. 5.00 Crores and Rs.50.00 crores for expansion/modernization.

1. Nuclear Power and related projects such as heavy water plants, nuclear fuel complex, rare earths;
2. River valley projects including hydel power, major irrigation and their combination including flood control,
3. Ports, harbours, airports (except minor ports and harbours)
4. Petroleum refineries including crude and product pipelines;
5. Chemical fertilizers (nitrogenous and phosphatic other than single super phosphate;
6. Petrochemical complexes (both olefinic and aromatic) and petrochemical intermediates such as DMT, Caprolactum, LAB, etc., and production of basic plastics such as LDPE, HDPE, PP, PVC;
7. Exploration of oil and gas and their production, transportation and storage.
8. Synthetic rubber,
9. (a) Primary metallurgical industries (such as production of iron & steel, aluminium copper zinc, lead and ferro alloys);

   (b) Electric are furnaces (mini steel plants);
10. Chlor alkali industry;
11. Viscose staple fiber and filament yarn;
12. Storage batteries integrated with manufacture of oxides of lead antimony alloy;
13. Thermal power plants,
14. Pulp, paper and newsprint;
15. Cement;
16. Highway projects;

3.3.2 RESTRICTION ON ACTIVITIES IN TIPPAGONDANA HALLI RESERVOIR CATCHMENT AREA.

Thippagondanahalli reservoir (TGR) built at the confluence of Arkavathi and Kumudvathi river is one of the sources of drinking water (125MLD) to the city of Bangalore and surrounding areas since 1930. The study carriedout by ISRO in association with IN-RIMT reveals that unplanned development in the catchment area (1453 sq.km) is one of the main reasons on the deteriorating quality and reduced inflow into the reservoir. Based on study report and in order to ensure improvement in the quality and quantity of inflow of water into TGR, KSPCB has recommended to the Government that the area identified by ISRO be declared as a separate zone under Environment (Protection) Act 1986. In exercise of the powers conferred by Section 5 of the Environment (Protection) Act 1986. The Government of Karnataka issued the following directions in respect of TGR catchment area which are categorized into 4 zones, specifying the nature of restricted or regulated activities and the authorities responsible for regulating the activities, with effect from 18-11-2003.

Zone	Area covered	Nature of restricted/regulated activities	Authorities responsible for regulation
(1)	(2)	(3)	(4)
Zone-1	Entire Tippagondanahalli Reservoir (TGR) catchment area specified in annexure to this Notification	(a) Regulation and checking of over exploitation of ground water (b) No fresh leases or license for mining, quarrying and stone crushers shall be granted.	Director, Mines and Geology Department.
		(c) No person shall dispose solid as well as liquid waste in this area without Scientific processing.	1. Department of Urban Development.
		(d) To ensure adoption of rain water harvesting systems in all the new and existing buildings, within six months from the date of issue of this order	2. Bangalore Water Supply and Sewerage Board. 3. Nelamangala Planning Authority.
		(e) To promote organic farming including bio-Fertilizer and bio-pesticide.	Secretary, Department of Agriculture/Horticulture.
Zone-2	Area covered within 2 kms from the Thippagondanahalli Reservoir (TGR) boundary.	No person shall carry on activities other than agricultural or Agriculture related activities without prior permission	1. Department of Urban Development. 2. BMRDA 3. Nelamangala Planning Authority. 4. Bangalore Development Authority 5. Directorate of Municipal Administration

			6. Bangalore Water Supply and Sewerage Board.
Zone-3	Area covered within 1 km distance from the river banks of Arkavathy (only upto Hesarghatta tank from TGR) and Kumudvathi	No person shall carry on activities other than Agricultural orAgriculture related activities without prior permission	1. Department of Urban Development. 2. BMRDA 3. Nelamangala Planning Authority. 4. Bangalore Development Authority 5. Directorate of Municipal Administration 6. Bangalore Water Supply and Sewerage Board.
Zone-4	Area covered within 1 km to 2 km distance, from the river banks of Arkavathi (only up to Hesarghatta Tank from TGR) and Kumudvathi (Excluding the areas falling within zone 2)	a) Permit only those industrial activities which are listed as Green category, by the Karnataka State Pollution control Board with mandatory adoption of rainwater harvesting systems and waste water treatment facilities. The other regulatory/ civic agencies to issue permit only after Consent for Establishment (CFE) is obtained from the KSPCB. (b) Permit new buildings with only ground and first floor with mandatory adoption of rainwater harvesting systems.	1. Department of Urban Development. 2. BMRDA 3. Nelamangala Planning Authority. 4. Bangalore Development Authority 5. Directorate of Municipal Administration 6. Bangalore Water Supply and Sewerage Board.

Further in exercise of the powers conferred under Water Act and Air Act the Government of Karnataka issued following directions to Karnataka State Pollution Control Board on 12-1-2004.

1. Not to issue any consent to any new industry, industrial operation, industrial process or an extension or addition thereto in Zone-2 and Zone-3 as per schedule mentioned above.
2. To allow, in Zone-4 as per schedule mentioned above, only those new industries listed in Green category, subject to adoption of rainwater harvesting systems and waste water treatment facilities.
3. Ensure compliance to the consent conditions so that the industries do not let out untreated industrial effluents in the said catchment and in particular in Zone 2, 3 and 4 as per schedule mentioned above.
4. To conduct regular water analysis in both Arkavathi and Kumudvathi Rivers, to TG reservoir and tanks within the TGR catchment.
5. Adoption of rainwater harvesting must be made mandatory in the consent condition for the existing industries in Zone-1.

TG HALLI CATCHMENT AREA

3.3.3. RESTRICTION ON USE OF DRINKING WATER FOR NON-POTABLE PURPOSES IN BANGALORE CITY

(Government Order No.FEE 188 ENV 2003 dated:14.08.2003)

In exercise of the powers conferred under section 5 of the Environment (Protection) Act, 1986 the Government hereby directs the Commissioner, Bangalore Mahanagara Palike (BMP) and Director, Horticulture Department, Chairman, Karnataka State Pollution Control Board, Secretary to Government, PWD and Principal Secretary, Transport Department , to take all necessary steps to ensure that only tertiary treated water is used for non-potable purposes, like all gardening including parks, resorts and golf course, washing servicing and cleaning of vehicles and all civil construction activities like building multistoried apartments, commercial complexes, housing complexes of private developers and State Government and Central Government, including roads and bridges in Bangalore city.

The Government further directs the respective license issuing and plan sanctioning authorities to invariably include the condition in their approvals and licenses that only tertiary treated water shall be used for non potable purposes as stated above.

Bangalore Water Supply and Sewage Board shall not sanction potable water supply connection to all such activities as mentioned above.

In the first phase Government directs that use of tertiary treated water should be encouraged for the following. The enforcing authority is also shown against each activity.

1.	Use of water for BMP Parks	Commissioner, BMP
2.	Construction of apartments, Commercial buildings, housing complexes of private developers State Government and Central Government	KSPCB
3.	Construction of roads in Bangalore City Municipalities around Bangalore, layouts of BMP, BDA, KHB, National Highways, PWD roads	KSPCB
4.	Service Centers of servicing of Cars, trucks servicing of BMTC vehicles at bus depots	KSPCB

Bangalore Water Supply and Sewage Board will make all arrangements including construction of filling points, installation of vending machines at sewage treatment plants for supply of tertiary treated water in multiples of thousand liters.

Bangalore Water Supply and Sewage Board will issue periodically appeals to public to conserve potable water.

Non-compliance of the directions attracts penal provisions in accordance with section 15 and section 17 of the Environment (Protection) Act 1986.

3.3.4. ANALYSIS FEE STRUCTURE

(A) Government of Karnataka has notified following rates of fee to be charged by the KSPCB for monitoring and analysis of water pollutants under the Karnataka Water (Prevention & Control of Pollution) Rules (G.O. No. **FEE 257 ENV 2001, DATED 3rd JUNE 2002 (Rule 24 A)**

(B) Government of Karnataka has notified following rates of fee to be charged by the KSPCB for monitoring and analysis of air pollutants under the Karnataka Air (Prevention & Control of Pollution) Rules (G.O. No. **FEE 257 ENV 2001, DATED 3rd JUNE 2002)**

Sl. No.	Name of the Laboratory tests	Fee (Rupees)
1.	Conductivity	25.00
2.	pH	25.00
3.	Suspended Solids	50.00
4.	Dissolved Solids	50.00
5.	Total Solids	75.00
6.	Settleable Solids	50.00
7.	Turbidity	25.00
8.	Acidity/Alkalinity	50.00
9.	Bicarbonate	50.00
10.	Boron	150.00
11.	Carbon Dioxide	50.00
12.	Colour	25.00
13.	Chloride	50.00
14.	Residual Chlorine	50.00
15.	Cyanide	150.00
16.	Dissolved Oxygen	50.00
17.	COD	150.00
18.	BOD	300.00
19.	Fluoride	100.00
20.	Hardness	50.00
21.	Calcium Hardness	50.00
22.	Magnesium Hardness	100.00
23.	Salinity	50.00
24.	Ammonical Nitrogen	100.00
25.	Nitrate	100.00
26.	Nitrite	100.00
27.	Total Kjheldal Nitrogen	150.00
28.	Oil & Grease	100.00
29.	Phenolic Compound	100.00
30.	Phosphate	100.00
31.	Sulphate	75.00
32.	Sulphide	100.00

33.	Arsenic	150.00
34.	Barium	150.00
35.	Cadmium	150.00
36.	Chromium Total	150.00
37.	Chromium Hexavalent	150.00
38.	Copper	150.00
39.	Iron	150.00
40.	Manganese	150.00
41.	Nickel	150.00
42.	Potassium	100.00
43.	Sodium	100.00
44.	Percent sodium	300.00
45.	Sodium Absorption Ratio	300.00
46.	Selenium	150.00
47.	Total Coliform (MPN)	150.00
48.	Fecal Coliform	150.00
	AIR SAMPLES	
Sl.No.	**Name of the analysis/Laboratory tests**	**Fee (Rupees)**
1.	Respirable Suspended Particulate Matter	300.00
2.	Sulphur Dioxide (SO_2)	300.00
3.	Oxides of Nitrogen	300.00
4.	Suspended Particulate Matter	300.00
5.	Lead	150.00

4.0 GUIDELINES

4.1 GENERAL GUIDELINES FOR SITING OF INDUSTRIES

- No new industry specified below shall be permitted to be established within 1.5 Km from the embankment of the streams, rivers and dams as indicated below. If any of these water bodies are the source of drinking water, then such distances shall be stipulated which will not affect such waters by discharge of the pollutants.

List of industries covered under the siting guidelines:

(a) Distilleries

(b) Tanneries, Sugar, Dairies

(c) Fertilizer

(d) Pulp & Paper (Large)

(e) Chemical Units (Large & Medium Scale)

(f) Petroleum Refinery

(g) Textile Dyeing units (Large & Medium Scale)

(h) Steel Plant (Electroplating, Heat Treatment, etc.,)

(i) Ceramics (Large & Medium Scale)

(j) Thermal Power Station

(k) Basic Drug Manufacturing Units

(l) Pesticide (Large & Medium Scale)

(m)Asbestos

(n) Foundries (Large & Medium Scale)

(o) Large Cement Plant (Having 200 T/D or more production capacity)

(p) Primary Metallurgical Industries

(q) Hydro Cyanic Acid and Derivatives

(r) Petroleum Products

(s) Viscose Staple Fiber and Filament Yarn (Large)

(t) Caustic Soda, Chlorine, Phosphoric Acid, Hydrochloric Acid, Sulphuric Acid, units

(u) Dye & Dye Intermediates

(v) Storage Batteries with oxides of lead and antimony units

List of waterbodies:

(a) Cauvery

(b) Kabini

(c) Arkavathy

(d) Shimsha

(e) Pennar

(f) Hemavathy

(g) Lakshman Thirtha

(h) Gundal river

(i) Lokapavani

(j) Palar

(k) Thunga

(l) Bhadra

(m) Thungabhadra

(n) Krishna

(o) Bheema

(p) Varada

(q) Ghataprabha

(r) Malaprabha

(s) Vedavathi

(t) Karanja

(u) Hagari

(v) All west flowing streams/rivers*

(w) All other streams/rivers carrying water either seasonally or throughout the year*

(x) All major Dams, drinking water source (surface)

(y) All major irrigation canals.

*This is subject to the usefulness of such streams and rivers for supply of drinking water facility.

- No new Large/Medium/Small (Red & Orange Category) industry generating effluents, and or emissions shall be permitted within city/municipal limits and residential areas.
- The Karnataka Industrial Area Development Board (KIADB) or any other agency developing industrial area shall obtain Environmental clearance from the Department of Ecology and Environment and clearance from the Karnataka State Pollution Control Board before establishing such area. Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports shall be submitted to the Karnataka State Pollution Control Board and obtain approval.
- Distance for establishing new industries specified in certain special category area shall be follows.

(A) Ecologically and/or otherwise sensitive areas:

At least 25 Kms depending on the geo-climatic conditions, the requisite distance shall have to be increased by the appropriate agency.

(B) Coastal areas:

At least ½ km. from high tide line. The stipulations made vide Notification No.SO 114(E) dated 19.2.1991. by Government of India, Ministry of Environment and Forests, issued under the Environment (Protection) Rules, 1986, shall be strictly adhered to.

(C) Transport/ communication system:

At least ½ km. from National & State Highways and Railway.

(D) Major settlements (3,00,000 population):

Appropriate distance for establishment of major industries around the cities having more than 3,00,000 population shall be prescribed by Karnataka State Pollution Control Board. Wherever these distance cannot be maintained and at the same time it is inevitable to locate the industry, measures for prevention of pollution due to effluents, noise emissions, odour etc., shall be insisted by the Board.

Note: Ecological and/or otherwise sensitive areas include-

(i) Religious and Historic Places

(ii) Archaeological Monuments

(iii) Scenic Areas

(iv) Hill Resorts

(v) Beach Resorts

(vi) HealthResorts

(vii) Coastal Areas rich in Mangroves, Breeding Grounds of Specific Species

(viii)Estuaries rich in Mangroves, Breeding Grounds of Specific Species

(ix) Biosphere Reserves

(x) National Parks and Sanctuaries

(xi) Natural Lakes, Swamps

(xii) Seismic Zones

(xiii)Tribal Settlements

(xiv) Areas of Scientific and Geological Interest

(xv) Defense Installations, specially those of security importance and sensitive to pollution and

(xvi) Air Ports

2. No forest land shall be converted into non-forest activity for the sustenance of the industry.
3. Land acquired shall be sufficiently large to provide for appropriate treatment of waste water still left for treatment after maximum possible reuse and recycle. Reclaimed (treated waste water shall be used to raise green belt and to create water body for aesthetics, recreation and if possible for aquaculture. The green belt shall be sufficiently wide around the boundary limit of the industry. For industry having odour problem, it shall be minimum of 30 meters wide.
4. Enough space should be provided for storage of solid waste, so that the same could be available for possible reuse.

4.2. POLICY GUIDELINES FOR SITING, AIR POLLUTION CONTROL MEASURES AND STANDARDS FOR STONE CRUSHING UNITS IN KARNATAKA STATE.

(Government of Karnataka OM No FEE 13 EAA 99 (P) dtd 19.11.2001)

1. Siting of Stone Crushers:

a. The location of the Stone Crushers shall be minimum 250 meters away from the boundary of National Highways and State Highways.

b. Minimum distance should be 500 meters from sensitive areas such as religious places, schools/ educational institutions and rivers/lakes.

c. Whenever the Stone Crushing unit is in the vicinity of the water body, the unit must have garland canal and/or suitable drainage system shall be provided around the site/each unit, to collect the dusty storm water runoff. The drains shall be connected to a suitably designed holding tank to allow settlement of dust. The tank water may be suitably disposed off or used for dust control spraying. The settled dust in the tank has to be removed periodically and used to make concrete blocks etc.

2. Air Pollution Control Measures:

a. To cover the crusher.

b. The jaw crusher, the chute and conveyor system for crushed stone to be covered with suitable semi circular, M.S.Sheet/Zinc sheet etc., the rotary screen to be completely closed leaving space at bottom for collection of the sieved jelly. Suitable exhaust and venting system of adequate capacity to be provided to guide the dust emanating from the crushers into the stack through a cyclone to collect the dust.

c. The conveyer belts, chutes especially carrying smallest particles should be covered with semi circular M.S.Sheets and heaps shall be located in appropriate sheds wherever possible with all possible arrangements to prevent escape of dust during loading and unloading operations. Also, suitable control measures like hood and cyclone system shall be provided.

d. Suitable water sprinkling system shall be provided to reduce the dust from each dust generation area.

e. Minimum 5 rows with a minimum 50 meters wide green belt of tall growing leafy trees should be planted around the crusher plant area to minimize dust and improve aesthetic appearance.

f. Suitable safety measures shall be provided to protect workers from the ill effect of dust pollution.

g. Suitable wind-breaking wall shall be provided to arrest the dust blown out of the premises.

h. The roads inside the crusher premises shall be metalled and water sprinkling arrangement shall be provided.

3. Standards:

a. Quantitative standards for the Suspended Particulate Matter (SPM).

The Suspended Particulate Matter contribution value at a distance of 40 meters from a controlled isolated as well as from a unit located in a cluster should be less than 600 ug/NM^3. The measurements are to be conducted atleast twice a month for all the 12 months in a year and report submitted to the Board.

b. The Ambient Air Quality adjacent to the boundary of the stone crusher shall conform to the National Ambient Air Quality standards prescribed under Air Act.

c. Noise levels shall conform to the Noise (Regulations and Control) Rules, 2000.

In addition to the above, all the stone crushers shall comply to the standards prescribed under Environment (Protection) Act.

4.3 SITING GUIDELINES FOR ORANGE & GREEN CATEGORY UNITS

(GOK Notification No. FEE 195 ENV 2002 dtd 21.6.2003 & No. FEE 87 ENV 2005 dtd 5.7.2005)

1. Siting guidelines for green category industries would be minimal.
2. No new orange category industry generating effluent and/or emission shall be permitted within City/ Municipal limits. Automobile servicing & repair stations (excluding heavy vehicles) are permitted within these limits subject to compliance of point no. 9 of these siting guidelines
3. No orange category industry having effluent discharge shall be established within 500 m from the riverbanks/reservoirs/major tanks.
4. No orange category industry shall be established within 75m of National and State Highways, 50m of Main District Roads, 17.5m of Other District Roads and 15m of Village Roads.
5. No orange category industry shall be established within 12 Km from the notified archeological monuments.
6. No orange category industry shall be established within declared biosphere reserves and eco sensitive zone.
7. No orange category industry shall be established within 10Kms of the boundaries of National Parks and Sanctuaries and wildlife corridors.
8. The industries proposed in the coastal areas shall be governed by the Coastal Regulation Zone rules issued by Ministry of Environment and Forest, Government of India, from time to time.
9. Licenses for both orange and green category industries shall be issued by the Municipalities/Municipal Corporations after the industry obtains Consent for Establishment (CFE) from Karnataka State Pollution Control Board.

4.4 GUIDELINES FOR SPONGE IRON UNITS

(Source- Draft guidelines of CPCB)

The proposed standards will be applicable with effect from the date of notification to all new, green field units set up after the date of this notification and all expansion/ modernization of existing units taken up after the date of the notification. However, the existing units shall install effective pollution control system within six month and shall conform to the standards, after six month of the date of notification.

Stack Emission Standards

Particulate matter (PM) : 100 mg/Nm3 (Coal based) 50 mg/Nm^3 (Gas based)

Combustion Efficiency (CE) : After burner chamber shall be atleast 99.9% and be computed as below:

$$CE = \frac{\%\ CO_2}{(\%CO_2 + \%CO)} \times 100$$

(i) The Kiln off-gas stack height should be calculated for proper dispersion of SO_2 (with the formula of $H=14Q^{0.3}$. Where Q=emission of SO_2 in kg/h) as per emission regulations Part III of CPCB. Sulphur percentage shall be the percentage of sulphur in coal. The stack height in no case should be less than 45 m. Sampling Portholes and Platforms etc shall be provided as per CPCB regulation.

Adequately designed ESP or Bag Filter or Wet scrubbing system or any other adequate air pollution control system/combination of system should be installed to achieve the prescribed stack emission standards*.

* As it is techno economically not feasible to install WHRB for plants with less than 100 TPD capacity, it is recommended that plants with less than 100 TPD (total capacity) shall not be permitted in future.

Program for phasing out old plants having capacity less than 100 TPD may also be worked out.

(iii) The safety cap/emergency stack of rotary kiln type plant, which is generally installed above the After Burner Chamber (ABC) of feed end column, should not be used for discharging untreated emission, bypassing the air pollution control device.

(iv) Interlocking facility should be provided to ensure stoppage of plant if the pollution control system is not in operation of safety cap of the rotary kiln is bypassing the emissions.

Stack Emission Standards from de-dusting units

Particulate matter (PM) : 50 mg/Nm^3

All de-dusting units should be connected to a stack having a minimum stack height of 30 m. Sampling porthole and platform etc. shall be provided as per CPCB emission regulation to facilitate stack monitoring..

Fugitive Emission Standards

The fugitive emissions of suspended particulate matter (SPM) should not exceed 1000 ug/m^3 at a distance of 10 m (approx.) from the sources, identified and mentioned below, where fugitive dust emissions are anticipated. The measurement may be done, preferably on 8-hour basis with high volume sampler. However, depending upon the prevalent conditions at the site, the period of measurement can be reduced.

Sl. No.	Area	Monitoring Location
1.	Raw material handling area	Wagon tippler, Screen area, Transfer Points, Stock Bin area
2.	Crusher area	Crushing plant, vibrating screen, transfer points
3.	Raw material feed area	Feeder area, Mixing area, transfer points
4.	Cooler discharge area	Over size discharge area, Transfer Points
5.	Product processing area	Intermediate stock bin area, Screening plant, Magnetic Separation unit, Transfer Points, Over size discharge area, Product separation area, Bagging area
6.	Other areas	Areas as specified by State Pollution Control Board

Code of Practice for Pollution Prevention

(i) Raw Material Handling and Preparation

a. Unloading of coal by trucks or wagons should be carried out with proper care avoiding dropping of the materials from height. It is advisable to moist the material by sprinkling water while unloading.

b. Crushing and screening operation should be carried out in enclosed area. Centralized de-dusting facility (collection hood and suction arrangements followed by de-dusting unit like bag filter or ESP or equally effective method or wet scrubber and finally discharge of emission through a stack) should be provided to control Fugitive Particulate Matter Emissions. Particulate Matter emission level in the stack should not exceed 50 mg/Nm^3. Water sprinkling arrangement should be provided at raw material heaps and on land around the crushing and screening units.

c. Work area including the roads surrounding the plant shall be metaled/asphalted or concreted.

d. Enclosure should be provided for belt conveyors and transfer points of belt conveyors.

The above enclosures shall be fixed rigid (and not of flexible/cloth type enclosures) and fitted with self-closing doors and close fitting entrances and exits, where conveyors pass through the enclosures, flexible covers shall be installed at entry and exit of the conveyor to the enclosures, minimizing the gaps around the conveyors. In wet system, water sprays/sprinklers shall be provided at the following strategic locations for dust suppression during raw material transfer:

- Belt conveyor discharge/transfer point.
- Crusher/screen discharge locations.

(ii) Cooler Discharge and Product Separation Unit

Enclosures shall be provided for belt conveyors and transfer points of belt conveyors. Dust extraction cum control system shall be installed preferably bag filters or ESP to arrest product loss in cooler discharge and product separation area.

(iii) Extensive plantation/Green belt shall be developed along the roads and boundary line of the industry. For plants having capacity upto 100 TPD of production a 15 m width Green Belt along the boundary shall be maintained, while for plants having capacity more than 100 TPD of production a 30 m width Green Belt along the boundary shall be maintained.

(iv) Monitoring of stack emissions, fugitive emissions, trade effluent and noise level shall be done as per CPCB regulations and consent conditions specified by the SPCB.

(v) Pollution control systems shall be operated as an integral part of production to ensure minimum emissions. Pollution Control System shall start before conveyor operation/operation of plant. Similarly pollution control system shall be stopped only after completion of conveyor operation/operation of plant so that possibility of dust settlement in ducts can be eliminated. Continuous evacuation of dust (from Dust catchers, ESPs Bag filter hopper etc). shall be organized.

Effluent Discharge Standards

(a) All efforts should be made to reuse and re-circulate the water and to maintain zero effluent discharge.

(b) Storm water / garland drain should be provided in the plant.

(c) In case of maintenance/ cleaning of the system the settling tanks effluent of wet scrubbing system or re-circulation system is required to be discharged, it should be treated suitably to conform to the following standards.

pH	Between 5.5 to 9.0
Total Suspended Solids (TSS)	≤ 100 mg/l
Chemical Oxygen Demand (COD)	≤250 mg/l
Oil and Grease (O&G)	≤ 10 mg/l

Noise Levels Standards

	Day time	Night time
Noise level	6.00 AM-10.00 PM	10.00 PM-6.00 AM
(at plant boundary)	Leq 75 dB (A)	Leq 70 dB (A)

Solid Waste Management

Char

Char should be mixed with coal or coal washery rejects and used as fuel in Fluidized Bed Combustion Boilers (FBC) for generation of power or sold to local entrepreneurs for making coal briquettes. It can also be mixed with coal fines, converted to briquettes and used in brick kiln. Under no circumstances it should be disposed in agricultural fields/other areas. Logbook for daily record, of Char production and usage must be maintained by industry and the record made available to officials of CPCB/SPCB/PCC during inspection.

Kiln Accretions

The kiln accretions are heavy solid lumps and can be used as sub- base material for road construction or landfill.

Gas Cleaning Plant (GCP)/Scrubber Sludge

The sludge should be compacted and suitably disposed off after ascertaining the composition.

Flue Dust

Flue dust is generated from air pollution control system i.e. ESP or any other air pollution control system installed with kiln. Secondary flue dust is also generated from Bag Filters or any other air pollution control equipment installed with Raw Material Handling, Coal Crusher, Cooler Discharge and Product house unit. The reuse/ recycling of the flue dust generated may be explored and suitably implemented.

Implementation period for existing plants.-

(i) Char based Power Plant

- For plant having configuration of at least 2x100 TPD kiln or for plants producing more than 200 TPD, Sponge Iron from smaller kilns, power production through FBC boiler using char as a part of fuel, is a viable option. Such plants should therefore plan to produce power for self-consumption.
- Individual Sponge Iron Plants of smaller capacity located in cluster can install a common char based power plant collectively.
- However, for plant having capacity 350 TPD or more, power generation using char as a part of fuel, in FBC Boiler shall be implemented in phased manner within 4 years of commissioning and targeting for 100% utilization of char.

(ii) The area for solid waste storage should be separately earmarked for effective management. The various type of solid waste generated should be stored separately in scientific manner so that it should not adversely affect the air quality, becoming air borne by wind or water regime during rainy season by flowing along with the storm water.

New Plant

1. No Sponge Iron Plant will be commissioned without Pollution control system for kiln off-gas treatment as well as without the de-dusting system for transfer points, day-bins, charging points in Kiln, cooler discharge point, Product processing etc. State Pollution Control Board will accord consent to operate only after Physical verification of the adequacy of the installed pollution control systems for meeting the standards and stipulated conditions in the consent to establish.
2. All new kilns shall have the independent stack with the kiln or multi-flue stacks in case two or more kilns are joining the same stack for better dispersion of pollutants.
3. Any entrepreneur having more than 2x100 TPD kiln may install WHRB for power generation.

   For plants having capacity of 350 TPD or more, power generation using char in FBC Boiler as part of fuel is necessary
4. Any new sponge iron plant being installed along with the other downstream facilities of converting the sponge iron into steel with/without further processing the steel should meet the target of 100% utilization of sensible heat of DR (Direct Reduction) Gas and Char for power generation. Wet scrubbing system for kiln off-gas treatment for such plants should not be opted.
5. Solid waste management program should be prepared with thrust on reuse and recycling. Solid waste disposal site should be earmarked within the plant premises. The storage site of solid waste should be scientifically designed keeping in view that the storage of solid waste should not have any adverse impact on the air quality or water regime, in any way.
6. Green belt shall be developed along the boundary line of the plant as well as plantation should be done on internal roads.

Siting Guideline for Sponge Iron Plants

Siting of new sponge iron plants shall be as per respective State Pollution Control Board guidelines. However the following shall be maintained.

(a) Forest/ Forest land/ ecologically and/or otherwise sensitive areas: A minimum distance of at least 2500 m (2.5 km) to be maintained.

(b) Location of Sponge Iron Plant should be at least 1000 m (1 km) from nearby residential habitation (residential localities/ village).

(c) The location of Sponge Iron Plant should be at least 500 m away from National Highway and State Highway.

(d) Radial distance between two Sponge Iron Plants should be 5 km for plants having capacity 1000 TPD or more. Setting up of smaller Sponge Iron Plants, less than 1000 TPD may also not be permitted within the radial distance of 5 km from the 1000 TPD plant.

(e) Sponge Iron Plants can be established in designated industrial areas / Estates as notified by State Govt. The criteria (b) to (d) may not be applicable in that case.

(f) If any plant/clusters of plants are located within 1 km from any residential area/ village they may be shifted by State Pollution Control Board/ State Govt. in a phased manner for which a time bound action plan is to be prepared by SPCBs.

4.5 GUIDELINES FOR SETTING UP HAZARDOUS WASTE OPERATING FACILITY

(SOURCE: CPCB)

Definition of hazardous wastes - its applicability

From the viewpoint of application of the HW (M&H) Rules, waste can be classified as hazardous if:

Waste substance is solid, semi-solid or non-aqueous liquid which because of its quantity, concentration or characteristics in terms of physical, chemical, infectious quality:

(a) can cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitate reversible illness, or

(b) pose a substantial present or potential hazard to human health or the environment when it is improperly treated, stored, transported, disposed of or otherwise managed

Thus, a waste is hazardous if it exhibits whether alone or when in contact with other wastes or substances, any of the characteristics identified below:

- Corrosivity
- Reactivity
- Ignitability
- Toxicity
- Acute toxicity
- Infectious property

Characteristics of Hazardous Waste

Corrosivity

A waste exhibits the characteristics of corrosivity if a representative sample of the waste has either of the following properties:

(a) any liquid which has a pH less than or equal to 2 or greater than or equal to 12.5 as determined by the standard test procedure; or

(b) a waste, which can corrode steel at a rate greater than 6.35 mm per year at a test temperature of 55 °C as determined by the standard test procedure.

Reactivity

A waste exhibits the characteristics of reactivity if a representative sample of the waste has any of the following properties:

(a) It is normally unstable and readily undergoes violent change without detonating

(b) It reacts violently with water

(c) It forms potentially explosive mixture with water

(d) It is Cyanide or Sulfide bearing waste which when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapours or fumes in a quantity sufficient to pose danger to human health or the environment.

(e) It is an explosive.

Ignitability

A waste exhibits the characteristics of ignitability if a representative sample of the waste has any of the following properties:

(a) It is a liquid other than an aqueous solution containing less than 24% organic solvents by volume and has flash point less than 60 °C as determined by a Pensky Martins closed cup tester using the standard test method.

(b) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes, and when ignited burns so vigorously and persistently that it creates a hazard.

(c) any oxidizing substance, when in contact with moisture or other materials/wastes, results in spontaneous fire or combustion.

Toxicity

A solid waste exhibits the characteristics of toxicity if the leachate from the representative sample by Toxicity Characteristics Leaching Procedure (TCLP) test method (as followed by USEPA, vide No: S.W 846, till Indian standards are notified by MoEF / CPCB) contains any of the contaminants listed in Table given below in excess of the concentration limits mentioned thereupon.

S. No.	TCLP Test Limits* Contaminant	TCLP Limit (mg/l)
01.	Arsenic	5.0
02.	Barium	100
03.	Benzene	0.5
04.	Cadmium	1.0
05.	Carbontetrachloride	0.5
06.	Chlordane	0.03
07.	Chlorobenzene	100.0
08.	Chloroform	6.0
09.	Chromium	5.0
10.	o-Cresol	200.0
11.	m-Cresol	200.0
12.	p-Cresol	200.0
13.	Cresol	200.0
14.	2,4-D	10.0
15.	1,4-Dichlorobenzene	7.5
16.	1,2-Dichloroethane	0.5
17.	1,1-Dichloroethylene	0.7
18.	2,4-Dinitrotoluene	0.13

19.	Endrin	0.02
20.	Heptachlor (and its epaoxide)	0.008
21.	Hexachlorobenzene	0.13
22.	Hexachlorobutadiene	0.5
23.	Hexachloroethane	3.0
24.	Lead	5.0
25.	Lindane	0.4
26.	Mercury	0.2
27.	Methoxychlor	10.0
28.	Methyl ethyl ketone	200.0
29.	Nitrobenzene	2.0
30.	Pentachlorophenol	100.0
31.	Pyridine	5.0
32.	Selenium	1.0
33.	Silver	5.0
34.	Tetrachloroethylene	0.7
35.	Toxaphene	0.5
36.	Trichloroethylene	0.5
37.	2,4,5-Trichlorophenol	400.0
38.	2,4,6-Trichlorophenol	2.0
39.	2,4,5-TP (Silvex)	1.0
40.	Vinyl Chloride	0.2

*** Note:**

1 These limits shall be applicable till the notification of leachate standards (including test method) under the E (P) Act, 1986

2. Best Demonstrated Available Technology (BDAT) standards shall be employed for parameters not mentioned.

3. Leachate collected shall be treated and disposed as liquid effluent in compliance of the standards notified under the E (P) Act, 1986.

Acute toxicity

A waste exhibits the characteristics of being acutely hazardous if a representative sample contains any of the following:

(a) wastes generated in the manufacturing process of halogenated phenols and other halogenated compounds

(b) wastes generated in the manufacturing/formulating process of pesticides or pesticide derivatives

(c) wastes generated during the manufacturing process of halogenated benzene under alkaline conditions

(d) off-specification or discarded products generated from the above processes, and

(e) containers used for handling hazardous / toxic substances / wastes

Infectious property

Wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animal or humans fall under this category.

Site selection

Under Rule 8 of the Hazardous (M&H) Rules, 1989, responsibility of site selection rests with the occupier or any operation of the facility or association is jointly responsible. However, it may happen that such selection may not get finalized. There may be some genuine reasons behind it, but the fact remains that the industry-sector may suffer in absence of a starting point. It will be worthwhile and a good management practice (GMP) if the operating agency for the well-being of their own industrial clients, undertakes a search and finalizes a site, The site along with its description, map & suitability can be suggested to the State Governments, SPCB & Industrial Association, for final approval, acquisition, persuasion or permission to purchase/making it non-agriculture use.

Site selection procedure be so adopted so that the distance of the site is not too close to cause impact, too far as involve heavy transporting cost and risk. A thick impervious cushion between the bottom of landfill and top of groundwater table, sufficiently big size to have 20 year's future waste, good dispersion of air pollutants, public acceptability, safe distance from habitations (present and future); are the points to be seen. Ranking has to be made by adopting Delphi technique as detailed in the Guidelines or by superimposing the rejection maps (CIS technique), as given in CPCB publication on Zoning Atlas.

On-site storage and generator premises

Although this is a basic requirement of the generator under Rule 4 (1), it may be found in practical world that the generator may not have that much awareness. Some feel that once the operating agency is appointed, the entire work they will do. Such situation has to be avoided. It will be worthwhile if operating agency takes a small step-forward and does this job.

Knowing the names of raw materials, intermediate products, bye-products, co-products and discarded products, one can find the character of the generated hazardous waste. The physical station in the factory from where it comes is also of a routine & common knowledge. The operating agency should preferably give earmarked drums or closed trolleys where the respective hazardous waste may be dumped by the workers. Incompatibility will be automatically observed, if colour-coding is fixed on the receiving drums. The drums be of adequate size, the frequency of removal be good enough as to avoid overflow. The on-site storage to be at isolated place (six meters in normal case but 15 meters in ignitable or reactive waste) within the premises, fenced raised platform, roofed and having a parapet wall, with signboards announcing the "hazardous waste" and "non smoking" signboards. The approach road be level, board and surface be plain without post-holes and well-illuminated. At no time the statutory limits of weight-period be crossed (say in normal case, 10T (or a truck load) -90 days, or if 1 T/month then 180 days or 6 T; and 1 T/month and has to be transported to 500 km then 270 days).

Record keeping must be good and should include remarks of daily inspection on abnormalities, drum-rupture, rains etc.

Pre-treatment on-site

Pre-treatment is a treatment given generally in-situ to a waste prior to its full-fledged further treatment at the common hazardous waste facility at a distance. The purpose of this spep of pretreatment is limited, as to be more amendable for transport and further treatment. Pretreatment has a smaller compass than treatment, though proves useful. Treatment is defined as any method, technique, or process, (including neutralization) designed to change the physical, chemical, or biological character or composition of any

hazardous waste so as to neturalise such waste or so as to recover energy or material resources from the waste, or so as to render such a waste non-hazardous or less hazardous, safer to transport, store or dispose of; or amendable for recovery, amenable for storage or reduced in volume.

In pretreatment, therefore, agency can keep an objective of neutralization, change in form, render it less hazardous, safer to transport or reduced in volume, and also includes addition of absorbent materials.

If the operating agency fix a pre-treatment unit in the premises of a generator, it may remain idle for most of time, with a small individual waste quantity. Any intermittent running creates problems and idle tie is not wise. The operating agency may therefore consider whether he can introduce a system of portable pretreatment units, mounted on or trailed to mobile van. Simple operation like neutralization, dewatering or absorbent mix can be so attempted.

Pre-transport precautions

Transportation can be a safe and secure operation only if pre-treatment precautions are taken honestly. The pre-transportation includes examination of the transport vehicle, transport trailer, containers, packing labeling, marking, the TREM cards, the manifest book and the interview of driver and helper.

In order to ensure that the materials are not unloaded anywhere, the operating agency is advised to paint the following at the back of the transport vehicle, viz. "This vehicle transports hazardous waste. If anybody finds it, emptying out of the contents, report to the nearest police/police station".

The Hazardous Waste Management Guidelines, 1991 & Motor Vehicle Rules 1989 provide a number of pretransporting helping clues to the operating agency and the same be observed.

The vehicle as well as the trailer be inspected. The cushioning, springs, shock absorbers, sparking from silencers, engine getting hot, starting troubles, closing arrangements, conditions of tyre, tubes of wheels and stepney, batteries and radiators be checked for satisfactory, including the alertness of driver and helper.

Containers need not be discarded everytime it is used. However, it be washed carefully to see that incompatible fresh waste is not filled on the residue of previous waste. Also examine for any physical structural defects. The old labels or colour-code has to be removed to avoid misleading messages. If a container is specially meant for a single trip use or if it has transported in the last trip anhydrous hydrofluoric acid, the same must not be pressed into service again.

Labels are symbolic representations of the hazardous associated with a particular matter. The labels must be affixed at a pre-determined location always. The lable should announce the most serious hazard, if the waste is capable to produce many hazards, e.g. if the materials is such which makes the driver restless due to odour nuisance and is also poison, write "poison" on the label being more hazardous prospects. The hierarchy can be fixed as follows for reporting, viz.

1. Radio-active material
2. Poison
3. Flammable gas
4. Non-flammable gas
5. Flammable liquid
6. Oxidiser
7. Flammable solid
8. Corrosive material
9. Corrosive material (solid)

10. Irritating material

11. Combustion liquid

12. Material, damaging vehicles or nuisance to crew

When the vehicles leaves the premises, it should not do so unless record keeping is fulfilled, TREM cards are given, driver is instructed on the nature of contents, possible leakages, antidotes and how to manage the spills including, reporting. The manifest book must be filled and copy no.3,4,5 &6 should accompany the driver.

The TREM card is an important link, and a good use of it ensures relief in the situation. TREM card is a Transport Emergency Card.

a). The characteristics of the wastes (physical state & properties, chemical constituents and exposure hazards,

b). Immediate first aid requirements.

c). With special reference to the material under transport, what procedure be followed by the transporter and fire-fighters/police:

1) in case a fire breaks out.

2) in case of impending explosions and

3) in case of accidental spillage.

d). For additional expert & specialized service who should be immediately contacted (name and address and phone no). This can be done by transporter/Police/Member of public.

Before the vehicle moves out, please also see whether it carries two warning signal boards (placards, which the driver might need to put on both sides of the road, in case an accidental spill occurs en-route. Sufficient paper towels also must be handy for mopping-up the spills.

Responsibilities of Hazardous Waste Transporter

Transporter of hazardous wastes shall be responsible for:

- Obtaining permission from SPCB/PCC for transport of hazardous waste [in addition to any other permissions that may be required under the Motor Vehicles (Amendment) Act of 1988].
- The transport vehicles shall be designed suitably to handle and transport the hazardous wastes of various characteristics.
- The transporter should follow all the Rules pertaining to transportation of hazardous waste as stipulated under HW (M & H) Rules, 1989 and as amended.
- Transporting the wastes in closed containers at all times.
- Delivering the wastes at designated points only.
- Informing SPCB/PCC or local authority, occupier/operator of a facility, and others concerned immediately in case of spillage, leakage or other accidents during transportation.
- The transporter shall train the driver with regard to the emergency response measures to be taken during the transportation of waste.
- Cleanup in case of contamination.
- Cleaning of vehicles shall be carried out at designated places i.e. either at TSDF/CETPs etc., or where there are facilities to treat such wastewaters.

Transportation Requirement

The following are the requirements pertaining to the transportation of hazardous wastes:

- Vehicle used for transportation shall be in accordance with the provisions under the Motor Vehicles Act, 1988, and rules made thereunder.
- Transporter shall possess requisite copies of the certificate (valid authorization obtained from the concerned SPCB/PCC for transportation of wastes by the waste generator and operator of a facility) for transportation of hazardous waste.
- Transporter should have valid "Pollution Under Control Certificate" (PUCC) during the transportation of HW and shall be properly displayed.
- Vehicles shall be painted preferably in blue colour with white strip of 15 to 30 cm width running centrally all over the body. This is to facilitate easy identification.
- Vehicle should be fitted with mechanical handling equipment as may be required for safe handling and transportation of the wastes.
- The words "HAZARDOUS WASTE" shall be displayed on all sides of the vehicle in Vernacular Language, Hindi, English.
- Name of the facility operator or the transporter, as the case may be, shall be displayed.
- Emergency phone numbers and TREM Card in Form 10 of HW (M & H) Rules, 1989 and as amended shall be displayed properly.
- Vehicle shall be fitted with roll-on / roll-off covers if the individual containers do not possess the same.
- Carrying of passengers is strictly prohibited and those associated with the waste haulers shall be permitted only in the cabin.
- Transporter shall carry documents of manifest for the wastes during transportation as required under Rule 7 of the Hazardous Waste (M & H) Rules, 1989, as amended.
- The trucks shall be dedicated for transportation of hazardous wastes and they shall not be used for any other purpose.
- Each vehicle shall carry first-aid kit, spill control equipment and fire extinguisher.
- HW transport vehicle shall run only at a speed specified under Motor Vehicles Act in order to avoid any eventuality during the transportation of HW.
- Educational qualification for the driver shall be minimum of 10th pass (SSC). The driver of the transport vehicle shall have valid driving license for heavy vehicles from the State Road Transport Authority and shall have experience in transporting the chemicals.

  Driver(s) shall be properly trained for handling the emergency situations and safety aspects involved in the transportation of hazardous wastes.
- The design of the trucks shall be such that there is no spillage during transportation.

Unloading and receiving on-site

At the on-site of operating agency facility, unloading is a regular feature, and hence proper gadgets can be easily provided. The condition of the internal roads be maintained smooth to avoid overflows. Proper fork-lifters, gantry, chain-shackles, cranes, suction pumps with nonflammable electrical connections be made available.

The manifest has to be checked on entry of the vehicle for any discrepancy, or else the copies duly signed must be distributed back, as no.4 (dark yellow) to transporter, no.5 (green) to State Pollution Control Board and no.6 (light blue) to the occupier generator and retaining no.3 (pink) in the operating agency site.

The receiving shift-in-charge shall record all the receipts and manifests, in a register as well as on a site map, irrespective of whether it is a temporary storage or permanent disposal. Care will be taken to see that incompatible wastes are not stored in each other's vicinity. In case of doubt, better to err on safer side.

Segregation

The operating agency will have to consider segregation from a number of view points, such as

- Depending on calorific value, whether the waste be sent for incinerator or other methods of treatment & disposal.
- Depending on concentration of constituent (say solvent), whether it be called as waste-water or liquid waste.
- Depending on concentration of constituent (say phenols), whether it be subjected to biological treatment like activated sludge plant, or be sent for incinerator
- Depending on its nature, whether it should be transported in a tank of particular lining also whether it may be allowed to commingle with another type of waste.

The decision of segregation, will have to be taken almost at every time a new waste with manifest enters the site, for storage, for identification, for pre-treatment and for final treatment and disposal.

If a spent solvent arrives and contains less than one percent total organic carbon (TOC), then as a thumb rule, it may be called as "solvent-carbon waste water" and if more than one percent it is "spent solvent". The former waste water may be segregated and sent for either biological treatment, steam-stripping or activated carbon technologies; and if later may be sent for recovery or incineration.

Secure Landfill

The common centralized facility of the operating agency is likely to consist of land-fill type of disposal.

Definitions:

"Landfill" means a disposal facility or a part of facility where hazardous waste is placed in or on land and is not a land treatment facility, a surface impoundment or an injection well.

While new methods of hazardous waste disposal are being developed, it appears that landfills will, atleast for the time being, continue to be the most favoured technique. In many countries, land is a readily available commodity and often areas of non-productive or derelict land may be made available for waste disposal. In many instances, land can be utilized in the near vicinity or on the premises of industrial companies, thereby reducing transportation costs. The potential also exists to reclaim certain areas for recreational purposes.

Landfilling is still the major disposal method in many countries. Yet in many instances landfilling sites are not properly chosen in terms of geophysical soil properties, hydrogeology, topography and climate. On a proposed site there is a need to carefully consider the potential for ground or surface water contamination from pollution by leachate migration or surface run-off from the site, Nonetheless, even when a site appears to have the right geophysical properties, its selection and use are not an absolute guarantee that contamination of groundwater can be avoided. Hence continual surveillance of the site and its surroundings must be maintained to check that the disposal of hazardous wastes can continue without posing a threat to the environment and to the general public. To reduce this threat landfill sites have been lined, for example with plastic materials(HDPE), in order to prevent leaching into groundwater supplies.

Incinerator

Incinerator means any enclosed device using controlled flame combustion. In designing an incinerator the operating agency should take into consideration the thermal feed rate, waste feed rate, organic chlorine feed rate (where relevant), minimum combustion gas temperature, minimum combustion gas residence time, primary and secondary combustion units, removal of HCl, SPM and other air pollutants, minimum oxygen concentration in secondary chamber, controlling fugitive emissions (by keeping combustion zone totally sealed or by maintaining the combustion zone pressure negative), stack height, eventuality of alternative fuel, eventually of change in waste containing POHC (principal organic hazardous constituent). The operating agency (OA) should convey these criteria to the State Boards for any comments and if there is any change subsequently in the gadget or geometry the same too must be informed or authorization got so amended. This will enable them to take a new trial burn if necessary.

In a reported experience of Bayer, AG Germany plant temperature in rotary kiln is maintained at 1000-1200°C, with oxygen concentration kept at 11% by volume, and detention of 4 seconds. The detention is 18 seconds in after burner chamber. In the waste heat recovery boiler, the temperature comes down to 320-350°C. The HCl, SO_2 is washed down. PCBs are found destroyed. The flow-sheet is shown in a figure 8 which may encourage the OA to put up an incineration train on such sound footing.

If the Operating agency desires to get rid of organics like halogenated solvents, petroleum refinery waste, Venyl chloride monomer, plastics, pesticides, off-spec pharmaceuticals etc, with a chemical destruction efficiency of 99.99%, then incineration will be his only choice, regardless as to whether he feeds as gas, liquid, semi-solid, or solids.

4.6 GUIDELINES FOR COMMON BIO-MEDICAL WASTE TREATMENT FACILITY

(Seurce : CPCB)

Installation of individual treatment facilities by small healthcare units requires comparatively high capital investment. In addition, it requires separate manpower and infrastructure development for proper operation and maintenance of treatment systems. The concept of CBWTF not only addresses such problems but also prevents proliferation of treatment equipment in a city. In turn it reduces the monitoring pressure on regulatory agencies. By running the treatment equipment at CBWTF to its full capacity, the cost of treatment of per kilogram gets significantly reduced. Its considerable advantages have made CBWTF popular and proven concept in many developed countries.

CBWTF as an option has also been legally introduced in India. The Bio-medical Waste (Management & Handling) Rules, 1998, gives an option to the bio-medical waste generator that such waste can also be treated at the common bio-medical waste treatment facility. The Second Amendment of the Rules in June, 2000, further eased the bottleneck in upbringing the CBWTF by making Local Authority responsible for providing suitable site within its jurisdiction..

In order to set up a CBWTF to its maximum perfection, care shall be taken in choosing the right technology, development of CBWTF area, proper designing of transportation system to achieve optimum results etc. These key features of CBWTF have been addressed in the following sections and will form the guidelines for the establishment of CBWTFs throughout the country.

Check List For Development Of Common Bio-Medical Waste Treatment Facility

The criteria for development of CBWTF have been discussed in detail in the previous chapters. However, to have at a glance check in developing CBWTF, following checklist is reproduced for convenience:

Treatment facility

(I) Following treatment facilities shall be provided in any common facility:

a. Autoclave (Pre-vaccum horizontal feeding) / Hydroclave / Microwave

b. Incineration (for waste belonging to categories 1,2 and 5 only.)

c. Shredder

d. Sharp pit (with drawing details) / Encapsulation /Recovery of metal in some factory may be looked into

e. Facility for bin washing, floor washing, vehicle washing

f. Effluent Treatment Plan

g Secured land fill (Untill a secured land fill comes up in the area, space within the CBWTF facility shall be used)

(II) Only waste category 1 & 2 shall be incinerated (if secured landfill is not available, waste category 5 may also be incinerated).

(III) All other infected waste shall be imparted autoclaving/ hydroclaving/ microwaving as applicable under the Bio-medical Waste (Management & Handling) Rules, 1998.

(IV) Incinerator, Autoclave/Hydroclave/Microwave shall be PLC based with tamper-proof control panel and recording devices.

Location

Reasonably away from residential and sensitive area

Land

Preferably not less than one acre land may be required to set up all the requisite facilities

Coverage area

In any area, only one CBWTF may be allowed to cater up to 10,000 beds at the approved rate by the Prescribed Authority. A CBWTF shall not be allowed to cater healthcare units situated beyond a radius of 150 km. However, in an area where 10,000 beds are not available within a radius of 150 km, another CBWTF may be allowed to cater the healthcare units situated outside the said 150 km.

Segregation

(I) Segregation shall be as per the Bio-medical Waste (Management & Handling) Rules as well as compatible with treatment facilities at CBWTF as suggested by the operator

(II) Generator is responsible for providing segregated waste to the operator

(III) The operator shall not accept un-segregated waste and report the matter to the prescribed authority.

Collection

(I) Respective coloured bags should be kept in similar coloured container i.e coloured bags shall not be directly kept in vehicle.

(II) Sharps shall be collected in puncture resistant containers.

(III) Temporary storage at healthcare unit shall be designated.

Transport Vehicle

(I) Dedicated vehicle for the collection of Bio-Medical Waste.

(II) Separate cabins shall be provided for driver/staff and the bio-medical waste containers.

(III) The base of the waste cabin shall be leak proof to avoid pilferage of liquid during transportation.

(IV) The waste cabin may be designed for storing waste containers in tiers.

(V) The waste cabin shall be so designed that it is easy to wash and disinfect.

(VI) The inner surface of the waste cabin shall be made of smooth surface to minimize water retention.

(VII) The waste cabin shall have provisions of sufficient openings in the rear and/or sides so that waste containers can be easily loaded and unloaded.

(VIII) The vehicle shall be labeled with the bio-medical waste symbol (as per the Schedule III of the Rules) and should display the name, address and telephone number of the CBWTF.

Storage

(I) Sufficient ventilated storage space for untreated and treated bio-medical waste shall be provided

(II) The flooring and walls (to a height of 2M from floor) shall be finished with smooth and fine material. There shall be minimum number of joints.

Record Keeping

(I) Documents such as collection advice taken from health care units for each category of waste, records of waste movements, logbook for the equipment and site records shall be maintained.

(II) All the record shall be available at the CBWTF site for inspection.

Disposal

(I) Incineration ash - Secured landfill

(II) Treated solid waste - Municipal landfill

(III) Plastic waste after disinfection and shredding - Recycling or municipal landfill

(IV) Sharps, after disinfection (if encapsulated) - Municipal landfill

(V) Treated wastewater - Sewer/drain or recycling

(VI) Oil &grease - incineration

Setting up and operation of CBWTF

(I) The proponent shall submit detailed work-plan of the proposed CBWTF to the

Prescribed Authority for issuance of "Consent to Establish". The work-plan should include complete details of the project such as site details, coverage area, infrastructure set up, transportation of bio-medical waste, operating procedure etc.

(II) The CBWTF operator shall carry out stack emission test of incinerator, incineration ash test, validation test of autoclave/microwave/hydroclave and applicable parameters of any effluent being discharged from the CBWTF, atleast quarterly from the approved laboratory and submit the quarterly report of the same to the SPCB/PCC.

4.7 SPECIFICATIONS FOR MUNICIPAL WASTE LANDFILL SITES

(Schedule III)

Site selection

1. In areas falling under the jurisdiction of 'Development Authorities' it shall be the responsibility of such Development Authorities to identify the landfill sites and hand over the sites to the concerned municipal authority for development, operation and maintenance. Elsewhere, this responsibility shall lie with the concerned municipal authority.
2. Selection of landfill sites shall be based on examination of environmental issues. The Department of Urban Development of the State or the Union territory shall coordinate with the concerned organisations for obtaining the necessary approvals and clearances.
3. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan.
4. The landfill sites shall be selected to make use of nearby wastes processing facility. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.
5. The existing landfill sites which continue to be used for more than five years, shall be improved in accordance of the specifications given in this Schedule.
6. Biomedical wastes shall be disposed off in accordance with the Bio-medical Wastes (Management and Handling) Rules, 1998 and hazardous wastes shall be managed in accordance with the Hazardous Wastes (Management and Handling) Rules, 1989, as amended from time to time.
7. The landfill site shall be large enough to last for 20-25 years.
8. The landfill site shall be away from habitation clusters, forest areas, water bodies monuments, National Parks, Wetlands and places of important cultural, historical or religious interest.
9. A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.
10. Landfill site shall be away from airport including airbase. Necessary approval of airport or airbase authorities prior to the setting up of the landfill site shall be obtained in cases where the site is to be located within 20 km of an airport or airbase.

Facilities at the Site

11. Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.
12. The landfill site shall be well protected to prevent entry of unauthorised persons and stray animals.
13. Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.
14. The landfill site shall have wastes inspection facility to monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.

15. Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipments and other facilities as may be required shall be provided.

16. Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangements for easy landfill operations when carried out in night hours shall be provided.

17. Safety provisions including health inspections of workers at landfill site shall be periodically made.

Specifications for land filling

18. Wastes subjected to land filling shall be compacted in thin layers using landfill compactors to achieve high density of the wastes. In high rainfall areas where heavy compactors cannot be used alternative measures shall be adopted.

19. Wastes shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up as per Schedule I.

20. Prior to the commencement of monsoon season, an intermediate cover of 40-65 cm thickness of soil shall be placed on the landfill with proper compaction and grading to prevent infiltration during monsoon. Proper drainage berms shall be constructed to divert run-off away from the active cell of the landfill.

21. After completion of landfill, a final cover shall be designed to minimize infiltration and erosion. The final cover shall meet the following specifications, namely :--

    a. The final cover shall have a barrier soil layer comprising of 60 cms of clay or amended soil with permeability coefficient less that 1×10^{-7} cm/sec.

    b. On top of the barrier soil layer there shall be a drainage layer of 15 cm.

    c. On top of the drainage layer there shall be a vegetative layer of 45 cm to support natural plant growth and to minimize erosion.

Pollution prevention

22. In order to prevent pollution problems from landfill operations, the following provisions shall be made, namely :-

    a. Diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions;

    b. Construction of a non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm high density polyethylene (HDPE) geomembrane, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than 1×10^{-7} cm/sec. The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer;

    c. Provisions for management of leachates collection and treatment shall be made. The treated leachates shall meet the standards specified in Schedule- IV;

    d. Prevention of run-off from landfill area entering any stream, river, lake or pond.

Water quality monitoring

23. Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 meters of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated beyond acceptable limit as decided by the Ground Water Board or the State Board or the Committee. Such monitoring shall be carried out to cover different seasons in a year that is, summer, monsoon and post-monsoon period.
24. Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) is to be considered after ensuring its quality. The specifications for drinking water quality monitoring shall be as per IS 10500,
25. Ambient Air Quality Monitoring
26. Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odour generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.
27. The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL).
28. The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to directly escape to the atmosphere or for illegal tapping. Passive venting shall be allowed if its utiliztion or flaring is not possible.
29. Ambient air quality at the landfill site and at the vicinity shall be monitored to meet the following specified standards, namely :-

Sl.No.	Parameters	Acceptable levels
(i)	Sulphur dioxide	120 ug/m^3 (24 hours)
(ii)	Suspended Particulate Matter	500 $\mu g/m^3$ (24 hours)
(iii)	Methane	Not to exceed 25 per cent of the lower explosive limit (equivalent to 650 mg/m^3)
(iv)	Ammonia daily average (Sample duration 24 hrs)	0.4 mg/m^3 (400 $\mu g/m^3$)
(v)	Carbon monoxide 8 hour average : 1 mg/m^3	1 hour average : 2 mg/m^3

29. The ambient air quality monitoring shall be carried out by the concerned authority as per the following schedule, namely:-

    (a) Sixtimes in a year for cities having population of more than fifty lakhs;

    (b) Four times in a year for cities having population between ten and fifty lakhs;

    (c) Two times in a year for town or cities having population between one and ten lakhs.

Plantation at Landfill site

30. A vegetative cover shall be provided over the completed site in accordance with the and following specifications, namely :-

    (a) Selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be allowed to grow;

    (b) The plants grown be such that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilised;

    (c) Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition.

    (d) Plantation to be made in sufficient density to minimize soil erosion.

Closure of Landfill site and Post-care

31. The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of the following, namely :-
    (a) Maintaining the integrity and effectiveness of final cover, making repairs and preventing run-on and run-off from eroding or otherwise damaging the final cover;
    (b) Monitoring leachate collection system in accordance with the requirement;
    (c) Monitoring of ground water in accordance with requirements and maintaining ground water quality;
    (d) Maintaining and operating the landfill gas collection system to meet the standards.
32. Use of closed landfill sites after fifteen years of post-closure monitoring can be considered for human settlement or otherwise only after ensuring that gaseous and leachate analysis comply with the specified standards.

Special provisions for hilly areas

33. Cities and towns located on hills shall have location-specific methods evolved for final disposal of solid wastes by the municipal authority with the approval of the concerned State Board or the Committee. The municipal authority shall set up processing facilities for utilization of biodegradable organic wastes. The inert and non-biodegradable waste shall be used for building roads or filling-up of appropriate areas on hills. Because of constraints in finding adequate land in hilly areas, wastes not suitable for road-laying or filling up shall be disposed of in specially designed landfills.

Standards for Composting, Treated Leachates and Incineration

(Schedule IV)

1. The waste processing or disposal facilities shall include composting, incineration, pelletisation, energy recovery or any other facility based on state-of-the-art technology duly approved by the Central Pollution Control Board
2. In case of engagement of private agency by the municipal authority, a specific agreement between the municipal authority and the private agency shall be made particularly, for supply of solid waste and other relevant terms and conditions.
3. In order to prevent pollution problems from compost plant and other processing facilities, the following shall be complied with, namely :-
    i. Ambient air quality monitoring shall be regularly carried out particularly for checking odour nuisance at down-wind direction on the boundary of processing plant.
    ii. The incoming wastes at site shall be maintained prior to further processing. To the extent possible, the waste storage area should be covered. If, such storage is done in an open area, it shall be provided with impermeable base with facility for collection of leachate and surface water run-off into lined drains leading to a leachate treatment and disposal facility;
    iii. Necessary precautions shall be taken to minimise nuisance of odour, flies, rodents, bird menace and fire hazard;
    iv. In case of breakdown or maintenance of plant, waste intake shall be stopped and arrangements be worked out for diversion of wastes to the landfill site;
    v. Pre-process and post-process rejects shall be removed from the processing facility on regular basis and shall not be allowed to pile at the site. Recyclables shall be routed through appropriate vendors. The non-recyclables shall be sent for well designed landfill site(s).
    vi. In case of compost plant, the windrow area shall be provided with impermeable base. Such a base shall be made of concrete or compacted clay, 50 cm thick, having permeability coefficient less than 10-7 cm/sec. The base shall be provided with 1 to 2 per cent slope and circled by lined drains for collection of leachate or surface run-off;

4.8 GUIDELINES FOR WASTE WATER MANAGEMENT SYSTEM

Major elements of wastewater management system & associated engineering tasks.

Element	Task
Wastewater generation	❖ Estimation of quantity ❖ Evaluate technique for reduction of waste-water ❖ Characterization
Source control	❖ Pre-treatment before collection ❖ Reuse
Collection system	❖ Design of sewers ❖ Design of collection system
Treatment system	❖ Primary treatment Secondary treatment Tertiary treatment. design the above system suitable to meet the standards & local conditions.
Disposal & reuse	❖ Use of treated effluent for agriculture/garden ❖ Reuse

Biological Treatment Processes:

- **Aerobic processes** are biological treatment processes that occur in the presence of oxygen.
- **Anaerobic processes** are biological treatment processes that occur in the absence of oxygen.
- **Anoxic denitrification** is the process by which nitric nitrogen is converted biologically to nitrogen gas in the absence of oxygen. This process is also known as anaerobic denitrification.
- **Biological nutrient removal** is the term applied to the removal of nitrogen and phosphorus in biological treatment process.
- **Facultative process** are biological treatment processes in which the organisms can function in the presence or absence of molecular oxygen.
- **Carbonaceous BOD** removal is the biological conversion of the carbonaceous organic matter in waste water to cell tissue and various gaseous end products. In the conversion, it is assumed that the nitrogen present in the various compounds converted to ammonia.
- **Nitrification** is the biological process by which ammonia is converted first to nitric and then to nitrate.
- **Denitrification** is the biological process by which nitrate is converted to nitrogen and other gaseous end products.
- **Substrate** is the term used to denote the organic matter or nutrients that are converted during biological treatment or that may be limiting in biological treatment. For example, the carbonaceous organic matter in wastewater is referred to as the substrate that is converted during biological treatment.

- **Suspended-growth process** are the biological treatment process in which the microorganisms responsible for the conversion of the organic matter or other constituents in the wastewater to gases and cell tissue are maintained in suspension within the liquid.
- **Attached-growth process** are the biological treatment processes in which the microorganisms responsible for the conversion of the organic matter or other constituents in the wastewater to gases and cell tissue are attached to some inert medium such as rocks, slag, or specially designed ceramic or plastic materials. Attached-growth treatment processes are also known as fixed-film process.

Physical, chemical, and biological characteristics of wastewater and their sources:

Characteristic	Sources
Physical properties:	
Colour	Domestic and industrial wastes, natural decay of organic materials.
Odour	Decomposing wastewater, industrial wastes.
Solids	Domestic water supply, domestic and industrial wastes, soil erosion, inflow/infiltration.
Temperature	Domestic and industrial wastes.
Chemical Constituents:	
Organic:	
Carbohydrates	Domestic, commercial and industrial wastes.
Fats, Oils and grease	Domestic, commercial, and industrial wastes.
Pesticides	Agricultural wastes.
Phenols	Industrial wastes.
Proteins	Domestic, commercial, and industrial wastes.
Priority pollutants	Domestic, commercial, and industrial wastes.
Surfactants	Domestic, commercial and industrial wastes.
Volatile organic compounds	Domestic, commercial and industrial wastes.
Other	Natural decay of organic materials.
Inorganic:	
Alkalinity	Domestic wastes, domestic water supply, groundwater infiltration.
Chlorides	Domestic wastes, domestic water supply, groundwater infiltration.
Heavy metals	Industrial wastes.
Nitrogen	Domestic and agricultural wastes.
PH	Domestic, commercial, and industrial wastes.
Phosphorus	Domestic, commercial, and industrial wastes, natural runoff wastes.
Priority pollutants	Domestic, commercial, and industrial wastes
Sulphur	Domestic water supply, domestic, commercial, and industrial wastes
Gases:	
Hydrogen sulfide	Decomposition of domestic wastes.
Methane	Decomposition of domestic wastes.
Oxygen	Domestic water supply, surface-water infiltration.
Biological Constituents:	

Animals	Open watercourses and treatment plants.
Plants	Open watercourses and treatment plants.
Protists:	
Eubacteria	Domestic wastes, surface-water infiltration, treatment plants.
Archaebacteria	Domestic wastes, surface-water infiltration, treatment plants.
Viruses	Domestic wastes.

Important Contaminants of Concern in Wastewater Treatment:

Contaminants	Reason for importance
Suspended Solids	Suspended solids can lead to the development of sludge deposits and anaerobic conditions when untreated waste water is discharged in the aquatic environment.
Biodegradable organics	Composed principally of proteins, carbohydrates, and fats, biodegradable organics are measured most commonly in terms of BOD (biochemical oxygen demand) and COD (chemical oxygen demand). If discharged untreated to the environment, their biological stabilization can lead to the depletion of natural oxygen resources and to the development of septic conditions.
Pathogens	Communicable diseases can be transmitted by the pathogenic organisms in wastewater.
Nutrients	Both nitrogen and phosphorus, along with carbon, are essential nutrients for growth. When discharged to the aquatic environment, these nutrients can lead to the growth of undesirable aquatic life. When discharged in excessive amounts on land, they can also lead to the pollution of groundwater.
Priority pollutants	Organic and inorganic compounds selected on the basis of their known or suspected carcinogenicity, mutagenicity, teratogenicity, or high acute toxicity. Many of these compounds are found in wastewater.
Refractory organics	These organics tend to resist conventional methods of wastewater treatment. Typical examples include surfactants, phenols, and agricultural pesticides.
Heavy metals	Heavy metals are usually added to wastewater from commercial and industrial activities and may have to be removed if the waste water is to be reused.
Dissolved inorganics	Inorganic constituents such as calcium, sodium, and sulfate are added to the original domestic water supply as a result of water use and may have to be removed if the wastewater is to be reused.

Odorous Compounds Associated With Untreated Wastewater:

Odorous Compound	Chemical Formula	Odour Quality
Amines	CH_3 NH_2, $(CH_3)3$ H	Fishy
Ammonia	NH3	Ammoniacal
Diamines	NH_2 $(CH_2)4$ NH_2, $NH_2(CH_2)5$ NH_2	Decayed fish
Hydrogen sulfide	H_2S	Rotten eggs
Mercaptans (e.g., methyl and ethyl)	CH_3SH, $CH_3(CH_2)$ 3SH	Decayed cabbage
Mercaptans (e.g., T=butyl and crotyl)	$(CH_3)_3CSH$, $CH_3(CH_2)$ 3SH	Skunk
Organic sulfides	$(CH_3)2S$, $(C_6H5)2S$	Rotten cabbage
Skatole	C_9H_9N	Fecal matter

Unit Operations and Processes and Waste Water Treatment System Used To Remove Major Contaminants Found In Waster Water

Contaminant	Unit operation, unit process or treatment system
Suspended Solids	Screening Grit removal Sedimentation Filtration Flotation Chemical polymer addition Coagulation/sedimentation
Biodegradable Organics	Activated sludge systems Fixed -film reactor : trickling filters Fixed -film reactor : rotating biological contactors Lagoon system (aerobic, anaerobic, facultative) Physical-chemical system
Volatile organics	Air stripping Off gas treatment Carbon adsorption Chlorination
Pathogens	Hypochlorination Bromine chloride Ozonation UV radiation Natural systems
Nutrients:	
Nitrogen	Suspended-growth nitrification and denitrification variations Fixed-film nitrification and denitrification system Ammonia stripping Ion exchange Break point chlorination Natural system
Phosphorus	Metal-salt addition Lime coagulation/sedimentation Biological Phosphorus removal Biological-chemical phosphorus removal
Nitrogen and Phosphorus	Biological nutrient removal
Heavy Metals	Chemical precipitation Ion exchange
Dissolved Organic solids	Ion exchange Reverse Osmosis Electrodialysis

Typical design information on screening devices used for the primary treatment of waste water.-

Item	Inclined screen
Screening surface	
Size classification	Medium
Size range	0.01-0.06
Screen material	Stainless steel wedge wire
Hydraulic capacity, m^3/m^2,min	0.61-2.45
Composition of waste solids, % solids by weight	10 - 15
Suspended-solids removal, %	15 - 30

Typical design information for primary sedimentation tanks.-

Item	Value	
	Range	Typical
Primary settling followed by secondary treatment:		
Detention time, hr	1.5-2.5	2.0
Overflow rate, $m^3/m^2.d$		
Average flow	30-50	
Peak hourly flow	80-120	100
Weir loading, $m^3/m.d$	125-500	250
Primary settling with waste activated-sludge return:		
Detention time, hr	1.5-2.5	2.0
Overflow rate, $m^3/m^2.d$		
Average flow	25 -30	
Peak hourly flow	50-60	60
Weir loading, $m^3/m.d$	125-500	250

Typical design information for secondary clarifiers.-

Type of Treatment	Overflow Rate, $m^3/m^2.d$		Solid Loading, Kg/ m^2. hr		Depth, m
	Average	Peak	Average	Peak	
Settling following air activated-sludge (excluding extended aeration)	15-30	40-50	4-6	10	3.5-6
Settling following oxygen Activated-sludge	15-30	40-50	5-7	10	3.5-6
Settling following extended aeration	7.5-15	25-30	1-5	7.0	3.5-6
Settling following trickling filtration	15-25	40-50	3-5	8.0	3-4.5

Settling following rotating biological contractors:					
Secondary effluent	15-30	40-50	4-6	10	3-4.5
Nitrified effluent.	15-25	30- 40	3-5	8.0	3-4.5

Typical design parameters for stabilization ponds.-

Parameter	Type of Pond					
	Aerobic low ratea	Aerobic hig h rate	Aerobic maturation	Aerobic-anaerobic facultative b	Anaerobic Pond	Aerated lagoon
Flow regime	Intermittently mixed	Intermittently mixed	Intermittently mixed	Mixed Surface layer		Completely mixed
Pond size, acres	<10	0.5-2	2-10	2-10	0.5-2	2-10
Operationc	Series or Parallel	Series	Series or Parallel	Series or Parallel	Series	Series or Parallel
Detention time, d	10-40	4-6	5-20	5-30	20-50	3-10
Depth, m	1-1.2	0.3-0.5	1-1.5	1.2-2.4	2.4-5	2-6
pH	6.5-10.5	6.5-10.5	6.5-10.5	6.5-8.5	6.5-7.2	6.5-8.0
Temperature Range, ^0C	0-30	5-30	0-30	0-50	6-50	0-30
Optimum Temperature, ^0C	20	20	20	20	30	20
BOD_5 loading, Kg/hectare.D	67-134	90-180	≥17	56-201	225-560	-
BOD5 conversion, %	80-95	80-95	60-80	80-95	50-85	80-95
Principal Conversion	Algae, CO_2 Bacterial Cell tissue	Algae, CO_2 Bacterial Cell tissue	Algae, CO_2 Bacterial Cell tissue NO3	Algae, CO_2 CH_4 Bacterial Cell tissue	CO_2 CH_4 Bacterial cell tissue	CO_2 Bacteria cell tissue
Algal concentration mg/L	40-100	100-260	5-10	5 -20	0-5	-
Efiluent suspended solids, emg/L	80-140	150-300	10-30	40-60	80-160	80-250

a Conventional aerobic ponds designed to maximize the amount of oxygen produced rather than the amount of algae produced.

b Pond includes supplemental aeration. For pond without supplemental aeration, typical BOD5 loading are about one third of those listed.

c Depends on Climate conditions.

d Typical values. Much higher values have been applied at various locations.

e Includes algae, microorganisms, and residual suspended solids. Values are based on an influent soluble BOD5 of 200 mg/L and with the exception of the aerobic ponds, an influent suspended solids of 200 mg/L

Thumb rules for design parameters of biological system.-

Parameters	Aerated Lagoon	Activated Sludge System	Extended Aeration System
Organic loading, Kg BOD/Kg MLSS/Day	0.2-0.4	0.4-0.5	0.05-0.2
Average MLSS, mg/L	100-400	2000-2500	4000-4500
Sludge recycle, %	-	25-50	50-100
Liquid depth in meter	2.5-3.0	3.5-4.5	1-3
Length to width ratio	Square or Rectangular	4 or more	4 or more
O_2 requirement Kg O2/Kg BOD	1.3-1.4	0.8	1.5-2
Hydraulic detention time	3 to 4 days	6 to 8 Hrs	12 to 72 Hrs
O2 capacity of surface aerator	1.8-2.2 Kg O2/KWH	2-2.2 Kg O2/KWH	2 Kg O2/KWH OR 2.8 Kg O2/length of Rotor/Hr.
BOD removal efficiency, %	With settling Chamber, 90-95 Without settling, 80-85	90-95	95-98
Sludge Volume Index	150-200	70-150	50-100
Sludge age (days)	<3days	3 to 30 days	30 or more
Excess sludge production, Kg/Kg BOD	0.75	0.55	0.1

BOD:N:P Requirement

Aerobic system = 100 : 5 :1

Anaerobic system = 100 : 2.5 : 0.5

Sludge Volume Index (SVI)

SVI = = ml of settled sludge
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mg/lit suspended matter x 1000

SVI = 50, excellent settling.

SVI = >50 <100, settle quite well.

SVI = Upto 150, settle reasonable well.

> 150, solids escape with effluent.

4.9. GUIDELINES FOR AIR POLLUTION CONTROL MANAGEMENT

"Air pollution is the presence of pollutant in ambient atmosphere substances, generally resulting from the activity of man, in sufficient concentration, present for a sufficient time and under circumstances which interfere significantly with the comfort, health or welfare of persons or with the full use or enjoyment of property".

Composition of Atmospheric Air:

Component	Content	
	% by volume	PPM
Nitrogen	78.09	780,900
Oxygen	20.94	209,400
Argon	0.93	9,300
Carbon dioxide	0.0318	318
Neon	0.0018	18
Helium	0.00052	5.2
Krypton	0.0001	1
Xenon	0.000008	0.08
Nitrous oxide	0.000025	0.25
Hydrogen	0.00005	0.5
Methane	0.00015	1.5
Nitrogen dioxide	0.0000001	0.001
Ozone	0.000002	0.02
Sulfur dioxide	0.00000002	0.0002
Carbon monoxide	0.00001	0.1
Ammonia	0.000001	0.01

Definitions of selected air pollution terms:

Aerosol - A dispersion of solid or liquid particles of microscopic size in gaseous media, such as smoke, fog or mist.

Dust - A loose term applied to solid particles predominantly larger than colloidal and capable of temporary suspension in air or other gases. Dusts do not tend to flocculate except under electrostatic forces; they do not diffuse but settle under the influence of gravity. Derivation from larger masses through the application of physical force is usually implied.

Droplet -A small liquid particle of such size and density as to fall under still conditions but which may remain suspended under turbulent conditions.

Fly Ash - The finely divided particles of ash entrained in flue gases arising from the combustion of fuel. The particles of ash may contain incompletely burnt fuel. The term has been applied predominantly to the gas-borne ash from boilers with spreader stoker, underfed stoker, and pulverized fuel (coal) firing.

Fog -A loose term applied to visible aerosols in which the dispersed phase is liquid. Formation by condensation is usually implied. In meteorology, a dispersion of water or ice.

Gas - One of the three states of aggregation of matter, having neither independent shape nor volume and tending to expand indefinitely.

Mist - A loose term applied to dispersions of liquid particles, the dispersion being of low concentration and the particles of large size. In meteorology, a light dispersion of water droplets of sufficient size to be falling.

Particle - A small discrete mass of solid or liquid matter.

Smoke - Finely divided aerosol particles resulting from incomplete combustion. Consist mainly of carbon and other combustible material. Soot -Agglomerations of particles of carbon impregnated with "tar", formed in the

incomplete combustion of carbonaceous material.

Vapor - The gaseous phase of matter, which normally exist in a liquid or solid state.

Methods of identifying air pollution:

1. Sensory recognition - Like strong or unusual ordours, reduction in visibility, eye irritation, acid taste in the mouth and feel of grit under foot.
2. Physical measurement of pollution - Identification of pollutant by physical measurement using standard sampling method and analysis.
3. Effects on plants, animals, and buildings.

Classification of pollutants:

Air pollutants can be classified as follows:

1. Natural contaminants
   e.g., natural fog, pollen grains, bacteria, and products of volcanic eruption.
2. Aerosols (particulates)
   e.g., dust, smoke, mists, fog and fumes.
3. Gases and vapours

   The various gases and vapours, which are important air contaminants are:

Group	Examples
Sulphur compounds	SO_2, SO_3, H_2S, mercaptans.
Nitrogen compounds	NO, NO_2, NH_3
Oxygen compounds	O_3,CO, CO_2
Halogen compounds	HF, HCl
Organic compounds	Aldehydes, hydrocarbons
Radioactive compounds	Radioactive gases

Primary and secondary air pollutants:

Air pollutants can also be broadly classified into two general groups - primary air pollutants and secondary air pollutants.

Primary air pollutants are those emitted directly from identifiable sources.

Examples of primary air pollutants:

1. Finer particles (less than 100 μ in diameter)
2. Coarse particles (greater than 100 μ in diameter)
3. Sulphur compounds.
4. Oxides of nitrogen.
5. Carbon monoxide.
6. Halogen compounds.
7. Organic compounds.
8. Radioactive compounds.

Finer aerosols include particles of metal, carbon, tar, resin, pollen, bacteria, etc.

Secondary air pollutants are those which are produced in the air by the interaction among two or more primary pollutants, or by reaction with normal atmospheric constituents, with or without photoactivation.

Examples of secondary air pollutants.-

1. Ozone.
2. Formaldehyde
3. PAN (peroxy acetyl nitrate)
4. Photochemical smog*
5. Formation of acid mists (H2SO4) due to reaction of sulphur dioxide and dissolved oxygen, when water droplets are present in the atmosphere.

   *Smog - is a synchronym of two words - smoke and fog. Smog can be of two types

   - photochemical or coal induced.

   Photochemical smog occurs under adverse meteorological conditions when the air movement is restricted. It could be seen/felt in highly motorized areas. Smog is caused by interaction of hydrocarbons and oxidants under the influence of sunlight giving rise to dangerous Peroxy Acetyl Nitrate (PAN).

For due to coal burning occurs at night on cold days when the temperature is below 10^0C when calm metrological conditions prevail.

Air pollution control measures:

Air pollution control equipment presently available are;

(i) Mechanical collector,

(ii) Fabric filter,

(iii) Electrostatic precipitator, and

(iv) Particulate scrubber.

(v) Flue gas desulphurization (FGD) system.

Essentially the above control equipments are used at the end of the process to receive the dust laden gas before being discharged into the atmosphere. Technology, for the above, currently available is quite developed with respect to present day regulatory norms.

(i) Mechanical collector

Mechanical collectors consists of two different types, one is a simple gravity settling equipment and other is cyclones. A performance limit of these devices is governed by particle size and settling velocity. These systems operate dry.

a) Gravity Separator

Mechanical collector specially gravity separator could be used as a pre-collector in the following circumstances;

- Dust loading is very high or requires to separate large particles before gas enters in to main collector.
- To separate glowing particle before entry of particulate to fabric filters.
- When the dust is abrasive and requires to be removed to avoid damage to fabric filter.

Parameters affecting the efficiency of the gravity settler are;

- Particle size - Larger the size, greater the settling.
- Density of the particles -Higher density, higher efficiency.
- Temperature of the gas - Higher the temperature, lower is the settling efficiency.
- Gas velocity - Lower the velocity, higher the collection.

b) Cyclone -Centrifugal separator

Efficiency of a dust separator is greatly enhanced if gravitational force is replaced by centrifugal force. Principle of separating dust by centrifugal force is used in cyclone. Cyclone is the most common type of dust collector. There is no moving parts and therefore it is almost maintenance free. It is used as an excellent pre-collector preceding fabric filter.

Cyclone is effective in removing much smaller particles than settling chamber can and occupies less space to handle the same gas volume. Cyclone can collect particle diameter down to 10 μm very effectively. Where dust loading is very high like in pneumatic conveying or coarse particles are required to be separated before fabric filter or electrostatic precipitator, cyclone is effectively used.

Advantages of cyclones are:

- It has low initial and running cost;
- there are no moving parts and hence practically it has no maintenance;
- has moderate pressure drop;
- low space requirement;
- can handle high dust loading; and
- has a possible use in high temperature and pressure.

Cyclone has disadvantages like;

- problem with abrasive dust;
- difficulty in removing light and fluffy dusts;
- tendency of outlet clogging because of sticky and hygroscopic dusts;
- clogging of outlet possibility due to dew point problem; and
- low collection efficiency for smaller particles less than 10 μm.

Performance Parameters of Cyclone

Performance of cyclone depends on the following;

- **Particle size:** Performance increases with increase of particle size.
- **Cyclone diameter:** Performance decreases with increase in diameter.
- **Cyclone body length**: A higher body length means more retention time for the gas inside the cyclone and hence better efficiency.
- **Ratio of cyclone diameter to cyclone outlet diameter:** Performance is directly proportional to the ratio D/De.
- **No of gas revolutions**: More the number of revolution of gas better is the performance. This necessitates longer cyclone.
- **Inlet velocity**: Dust removal efficiency of cyclone increases with the increase of gas flow, i.e. gas velocity to the extent when excessive turbulence is induced in the cyclone. A velocity beyond 26 m/s causes the efficiency to fall. This is depicted in Figure 6.15. In a practical cyclone velocities ranging from 12 m/s to 22 m/s is considered to be suitable for good efficiency.
- **Particle density:** Cyclone efficiency is directly proportional to particle density.
- **Gas viscosity:** Increase of viscosity causes the fluid drag to increase and thus the performance decreases.
- **Gas temperature:** Temperature has a direct effect on the viscosity. Viscosity increases with temperature which increases drag force and reduces the efficiency of cyclone.
- **Inlet dust concentration:** With the increase of inlet dust concentration the separation in cyclone changes from individual particle collection to collective separation. Even for a fine dust a moderate increase in dust concentration does have a significant effect on separation. Cyclone, thus, is very effective in collecting dust in pneumatic conveying system having very high dust concentration.

Multicyclone

Multicyclone is resorted to when gas volume to be handled is high and number of parallel cyclones becomes unpractical or higher efficiency is in demand. Multicyclone consists of a number of highly efficient small cyclones and therefore it offers a higher efficiency than an unit cyclone of some capacity.

(ii) Fabric Filter

Fabric filter, also known as Bag filter is most widely used among the high performing dust collectors like electrostatic precipitator, scrubber and fabric filter, because of its simplicity, low initial cost and its achieving a very low outlet emission. The basic principle of fabric filtration is to force the dust laden gas/ air through a fabric to arrest the dust on the fabric surface.

Working Principal

Dust laden gas is drawn by a fan through a fabric either woven or non-woven. Dust in suspension is arrested on the surface of the fabric and clean gas exhausted through the fan and stacked into the atmosphere. In the process of filtration a dust cake layer is formed on the fabric and the pressure drop increases across the fabric.

Mechanism of Particle Capture

Fabric filter often captures particles much smaller than the fabric pore size which shows that the mechanism of capture goes beyond simple sieving. Capture of particles on a fabric element thus follows one or combination of the following capture mechanism;

- Inertial impaction,
- Direct interception,
- Sieving,
- Electrostatic attraction, and
- Diffusion.

Types of Fabric

In the market, many manufacturers offer various fabric materials, either in chemical name or in their own trade name. Selection of a particular fabric depends on various properties of fabric like heat resistance, chemical resistance, physical properties, relative price, etc. and a designer must know the same before finalizing the material for a particular application.

- Polypropylene
- Polyester
- Acrylic
- Polytetrafluoroethylene
- Aromatic polyamide
- Fibre glass
- Gore tex
- Aromatic Polyimide
- Ceramic

Principle of fabric cleaning

As dust start accumulating on the surface of the bag the pressure drop across the bag also starts building up until it reaches a value which is unacceptable for the operation of the plant. The fan in the system fails to extract any more gas and ceases to work. Therefore, cleaning of fabric becomes necessary at regular interval to regenerate the fabric for continuing the filtration process.

A cleaning mechanism is considered to be most effective when;

- Energy requirement is low;
- There remains a residual pressure drop across the fabric or in other words a residual layer of dust so that there is no appreciable reduction in efficiency of the cleaned fabric in next cycle of filtering. A completely cleaned fabric is most inefficient;
- The required time of cleaning is minimum; and
- The effect of cleaning on fabric like wear, etc, is minimum. Wear may happen due to excess or poorly distributed cleaning energy.

Cleaning, basically, is resorted to in three ways;

- Mechanical shaking,
- Reverse air, and
- Pulse jet.

Mechanical Shake Cleaning

The concept of mechanical shaking is to give vertical and horizontal motion to the filter elements. The filter elements in the form of bags are hanged from a top frame and fixed at the bottom. The frame is given a forward and backward or up and down motion through an eccentric which is connected to a motor.

Reverse Air Cleaning - Bag Collapse

Bag collapse reverse air cleaning is employed for inside-to-outside filtration like mechanical shaking. Ambient air is made to pass through the fabric in the opposite direction to the gas flow. Thereby the bag deflates or collapses.

Reverse Air Cleaning - without Bag Collapse

In case of outside-to-inside filtration reverse air can also be used. The cleaning method is very similar to the pulse jet. Instead of using high pressure, short duration compressed air as in the case of pulse jet cleaning, low pressure air is used. Air is supplied by a separate fan to a traveling frame. The traveling frame moves on a vertical plane for horizontal cassette or envelop.

Pulse Jet Cleaning

In pulse cleaning, compressed air at a pressure varying between 2-6 kg/cm^2 depending on the design and size of the pulse valve, is used. A short quick pulse of air is applied to a row of bags through a solenoid operated diaphragm valve. At a pre-set time or pressure drop, across the fabric, the solenoid is energized by an electronic controller which assists to open the diaphragm in the valve and air is rushed from the air tank to the row of bags via the valve and blow pipe with nozzles of various designs and dimensions. The compressed air direction is opposite to the flow of filtration. Since the duration of pulse is very short in the order of few milliseconds there is no need to shut off the filtration while the cleaning is on.

Troubleshooting and maintenance

A fabric filter like any other pollution control equipment is selected for the most likely operating condition of plant guided by the plant normal operation. If the actual condition differ to a large extent then the fabric filter is not expected to perform to its desired level. Therefore, it is necessary to have a good practice of plant operation.

Along with good practice of plant operation it is also necessary to keep good mechanical health of fabric filter by regular, periodic checks and maintenance. It is often possible to detect problems by noting the pressure drop readings and visual observation of stack emission before anything serious happens and thus build up of historical data on fabric filter operation is quite possible to use as aid in future trouble shooting and maintenance.

Troubleshooting

Since pulse jet filter is more often used than any other type of trouble shooting and maintenance is limited to pulse jet fabric filter only.

Following problems may be encountered during operation;

High outlet emission

High outlet emission may be attributed to;

- there may be holes in some bags;
- the fabric may generally be worn out; and
- time setting of the cleaning sequence may be wrong.

Following remedial measures are suggested;

- First, the pressure drop across the fabric is checked. If the pressure drop is very low, the time interval between two consecutive cleaning pulses is to be increased or the pressure in the manifold is reduced.
- If the pressure drop cannot be adjusted to normal level further investigations must be carried out.
- A shut down is eminent for inspection.
- Top of bag hanging plate is inspected. Dust layer around a bag indicates that corresponding bag is damaged.
- If the damaged bags are discovered then the bags are changed if spares are available otherwise, till the spare is received the bag outlet must be shut by bag shutter so that the plant can be started.
- If the fibres are worn away and only the structure of the weave is visible, it is likely that the bags have to be changed.
- Bag damage may be caused by the temperature higher than the permissible for the fabric. If that is the case then temperature of the incoming gas is to be controlled by adjusting the process.

(iii) Electrostatic Precipitator

Dirty gas enters from the bottom and flows upwards through the electrical field generated by high voltage imparted to an electrode called discharge or emitting electrode. Gas around the discharge electrode is ionized and the region is filled with negative ions in the order of 109 ions/cm^3. Dust particles get charged to saturation within a few milliseconds immediately after entering into the ionized space. Amount of saturation charge is proportional to the surface area of the particle and the strength of the electrical field. Typically a particle diameter of 1μm gets a saturation charge equivalent to 250 electrons. After being charged the particles migrate towards another electrode that is earthed and called collecting electrode. Movement of particles is opposed by the viscous drag of the medium and a resultant velocity called migration or drift velocity is attained by the particles. For a typical population of particle diameter varying between 1 μm to 30 μm, migration velocity may vary from about 0.03 to 0.5 m/s. Particles on reaching collecting electrode get deposited, discharged and adhered to. Deposited dust cake is periodically dislodged by rapping collecting electrode.

Principle of electrostatic precipitation has four distinct phases as follows;

1. Ionization or corona formation,
2. Charging of particles,
3. Migration and precipitation of particles, and
4. Removal of deposited dust.
5. Due to its many-fold advantages like low pressure drop, low sensitivity to high temperature and aggressive gases, high collecting efficiency well in excess of 99%, and low maintenance, electrostatic precipitator has gained popularity over other dust collectors.

Commonly Encountered Precipitator Problems

Fundamental Problems

1. High resistivity particles
2. Re-entrainment of collected particles
3. Poor gas flow
4. Insufficient or unstable rectifier equipment
5. Insufficient number of corona sections
6. Improper or incompatible rapping
7. Gas velocity too high
8. Aspect ratio too small
9. Precipitator size too small

Mechanical Problems.-

1. Poor electrode alignment
2. Distorted or skewed collecting plates
3. Vibrating or swinging corona wires
4. Excessive dust deposits on corona electrodes and/or collecting plates (sometimes cemented on)
5. Formation of dust mountains in precipitator inlet and outlet ducts
6. Gas turning vanes and/or gas distribution screens plugged with dust
7. Air inleakage into hoppers, shells, or gas ducts
8. Gas sneakage around precipitation zones and/or through hoppers

Operational Problems

1. Full or overflowing hoppers
2. Shorted corona sections (broken wires, etc)
3. Rectifier sets or controls poorly adjusted
4. Precipitator overloaded by excessive gas flow
5. Precipitator overloaded by excessive dust concentration
6. Process upsets (poor combustion, steam leaks, etc.)

Charging of particles

In all practical applications, field charging is of more interest than diffusion charging since most of the dusts encountered in industries have average particle diameter more than 0.2 micron.

(iv) Scrubber

In liquid scrubber gas and liquid are made to come in contact intimately so that dust or gas or both can be collected or absorbed. Gas and liquid may be concurrent or counter current depending on the type of scrubber. In case of counter current flow gas is generally introduced from the bottom and water from the top through spray nozzles as in case of spray tower or packed bed scrubber. In case of concurrent flow, like in ventury scrubber, water is sheared or shattered by the gas stream and thereby fine liquid droplets are formed.

In case of particulate scrubber liquid droplets collect dust which is collected either by gravity or centrifugal force or both in case or gas absorption scrubber, resistance at the interface offered either by the gas or liquid as the case may be is the governing force for absorbing the gas.

Scrubber is broadly divided into,

- Particulate Scrubber, and
- Gas Absorption Scrubber.

(a) Particulate scrubber.-

Particulate scrubber is the type that is primarily designed to collect dust particles. There are various designs available such as,

- Spray tower,
- Centrifugal spray scrubber,
- Self induced or impingement Scrubber, and
- Venturi Scrubber.

Spray tower however is more used for gas absorption rather than dust collection. Venturi scrubber is the most efficient of all types of particulate scrubbers.

(b) Spray Tower.-

Spray tower is the simplest type of scrubber. A set of nozzle bank with nozzles is used to produce liquid droplets. Droplets are allowed to fall due to gravity that interacts with the countercurrent gas flow coming from below. Dusts carried by the gas is intercepted by the liquid droplets. The predominant collection mechanisms are inertial impaction and interception.

Speed of the droplets must be greater than the gas velocity so as not to be entrained by the gas and hence and droplet size has to be sufficiently large. Droplet size of about 1 mm gives a good result. Proper nozzle is selected accordingly for producing the correct droplet size.

Slurry that is generated after collection of dust is generally taken to a slurry tank and a portion of water is re-circulated. In practice about 30-35% liquid is re-circulated. Re-circulation has a risk that water carries some amount of dust, which may cause erosion, and clog the nozzles. However it is believed that solid content in the scrubbing liquid reduces surface tension, improves wetting characteristics results into better collection.

(c) Centrifugal Spray Scrubber.-

Like in cyclone, the collection efficiency is enhanced over settling chamber, scrubber efficiency is also increased from that of simple spray tower by employing centrifugal force. Velocity for both scrubbing liquid and gas is increased. In a typical centrifugal scrubber liquid is introduced from a centrally located header. Gas enters tangentially at the bottom of the scrubber giving spinning motion to the gas. Water is directed towards the periphery of the cyclone casing and care is taken so that no core of liquid is formed. To accomplish the same a core buster disc is provided. Because of centrifugal force of the gas dusts are thrown away towards the wall where they impact with liquid droplets only to be captured and collected.

(d) Self-induced Spray or Impingement Scrubber.-

This type of scrubber employs the principle of impingement and self-induced spray. The dust laden gas is made to impinge on to a pool of water and pass between the lip of venturi and the surface of water. Due to the resistance offered by pool of water at the contacting zone to the gas flow water is dispersed into fine droplets. Dust particles in gas has an impact on the droplets to form agglomerates. Larger agglomerates are collected in pool of water and settles at the bottom of the hopper. Smaller agglomerates

may be entrained by the leaving gas but eventually get collected by series of de-watering baffles. Baffles are so arranged that gas has to move through a zig-zag path enabling water droplets and dust agglomerates to be entrapped and eventually collected in a water pool.

This is generally used for the separation of particulate matters generated from grinding operation, foundries, coal handling plant, mining operation, etc. Since it operates on a fixed level pool of water, water consumption is very low. The level of pool has only to be replenished time to time for the loss of water due to evaporation and removal of sludge from the hopper.

The scrubber has several advantages such as reasonably high efficiency and no re-entrainment loss, simple in operation and low water consumption, reasonably high dust concentration i.e. about 20-25 g/m^3 can be handled.

(e) Venturi Scrubber.-

Venturi scrubber is the most efficient particulate scrubber amongst all and most commonly used. Very high efficiency even for particle size of 0.5 μm is achieved by venturi scrubber. There are applications such as for sticky and corrosive dusts where venturi scrubber is the only solution over fabric filter or electrostatic precipitator.

In Venturi scrubber gas is allowed to pass through a narrow throat where water is introduced. Water is disintegrated by the high velocity gas producing liquid droplets. Energy alone for disintegration is coming from the velocity of the gas. The narrow throat is called venturi section. It is preceded by a convergent section and succeeded by a divergent section. The throat can be rectangular or circular in cross section depending on the design.

Parameters affecting venturi scrubber performance.-

- Particle size: Efficiency increases with larger particle size.
- Gas velocity at throat: Efficiency increases with increased velocity. Suggested velocities range between 50-180 m/s.
- Pressure drop: Efficiency increases with increased pressure drop, the increase specially rapid for pressure drop over 10" W.G. (250 mm W.G).
- Inlet dust concentration: Efficiency decreases with decrease in inlet dust concentration and increases with the increase. Increased inlet dust concentration has little effect on pressure drop.
- Nature of dust: A soluble or hydrophilic dust is easily attached to the water droplet while hydrophobic dust is difficult to collect and thus requires more direct contact with the droplets.
- Water flow rate: Low velocity with high water ate may give desired efficiency than high velocity and low water flow. However very low velocity is ineffective for atomization . At low liquid-gas ratio i.e. below 2 gal/1000 cft, there is an increase in the effectiveness of water.
- Spray system: Liquid velocity and number of spray nozzles affect performance. For optimum collection efficiency injection velocity of 20 ft/s (6 m/s) or below appear desirable. Method or position of liquid introduction is important in so far as it prevents channeling of gas and liquid. Pressure drop across the venturi varies with the amount and method of water injection.
- Power input: High efficiency is associated with high power input. Power requirement increases as particle size decreases.
- Scrubber design: Efficiency has little relation with scrubber design.

Air pollution control device, its efficiency, advantage and disadvantage.

Device	Minimum particle size*, μm	Efficiency, % (mass basis)	Advantages	Disadvatages
Gravitational settler	>50	>50	Low pressure loss, simplicity of design and maintenance	Much space required; low collection efficiency
Centrifugal collector	5-25	50-90	Simplicity of design and maintenance. Little floor space required	Much head room required Low collection efficiency of small particles
			Dry continuous disposal of collected dusts	Sensitive to variable dust loadings and flow rates
			Low to moderate pressure loss	
			Handles large particles	
			Handles high dust loadings	
			Temperature Independent	
Wet collector			Simultaneous gas absorption and particle removal	Corrosion, erosion problems
Spray tower	>10	<80		Added cost of wastewater treatment and reclamation
Cyclonic	>2.5	<80	Ability to cool and clean high-temperature, moisture-laden gases	Low efficiency on submicron particles
Impingement	>2.5	<80		
Venturi	>0.5	<99		
			Corrosive gases and mists can be recovered and neutralized	Contamination of effluent stream by liquid entrainment
			Reduced dust explosion risk	Freezing problems in cold weather
			Efficiency can be varied	Reduction in buoyancy and plume rise
				Water vapor contributes to visible plume under some atmospheric conditions
Electrostatic Precipitator	>1	95-99	99 percent efficiency obtainable	Relatively high initial cost
			Very small particles can be collected flow	Precipitators are sensitive to variable dust loadings or rates
			Particles maybe collected wet or dry Pressure drops and power requirements are small compared with other high-efficiency collectors	Resistivity causes some material to safe guard personnel to be economically uncollectible Precautions are required from high voltage

			Maintenance is nominal unless corrosive or adhesive material are handled Few moving parts Can be operated at high temperature (300 to 450^{0}C)	Collection efficiencies can deteriorate gradually and imperceptibly
Fabric filtration	<1	>99	Dry collection possible Decrease of performance is noticeable Collection of small particles possible High efficiencies possible	Sensitivity to filtering velocity High-temperature gases must be cooled to 100 to 450^{0}C Affected by relative humidity (condensation) Susceptibility of fabric to chemical attack

* Collected at 90 percent efficiency.

(b) Gaseous Contaminants Control Devices:

Devices	Efficiency Criteria	Remarks
Combustion	Kind of after-burner, type of incinerator, flare design, flow rate, proper gas to air ratio for ignition.	Method is expensive when fuel value of gas is very low, moisture content is high and exhaust volume is very large.
Absorption (Scrubbers) (Gases are passed through liquid absorbents to remove gaseous pollutant)	Amount of surface contact between gas and liquid, contact time, concentration of absorbing medium, speed of reaction between absorbent and gases	Scrubbers include: Packed tower. Plate tower. Bubble-cap plate tower. Spray tower. Liquid jet scrubber absorbers.
Adsorption (Gases are passed through solid porous adsorbing structures)	Physical and chemicals characteristics of the adsorbent, the concentration and nature of gas to be adsorbed. Contact of pollutant with solid adsorbent, separation of adsorbed pollutant and recovery of gases for final disposal.	Absorbers are activated carbon, pulverized lime stone, alumina, bauxite, fullers earth, bone char, decolourising carbon, silica gel, etc.
Closed collection and recovery system	Gaseous streams should be of high concentration and uncontaminated	
Odour and their control	-	Odour could be controlled by Modification of the process, dilution by ventilation absorption & adsorption, combustion or oxidation, odour masking, odour counter action or neutralization, injection of a reactive substance.

Guideline for Calculation of Chimney Height:

(a) **Oil Fired Furnaces:**

Height of the chimney = $14(Q)^{0.3}$

Where Q = Total Sulphur-di-oxide emission in Kg/Hr

Sulphur content in different types of fuel:

Type of fuel	Sulphur content in %	Specific gravity
Coal	1.2	0.6
LECO	1.0	0.6
LDO	1.8	0.85
LSHS	0.70	0.91
HSD	0.035/0.05	0.845
Furnace oil	2.0- 4.0	0.9
Kerosene	0.25	0.8

(b) **Agro based waste as fuel:**

$H = 74(Q)^{0.27}$

Q = Ash produced in Tons/hr.

For agro based fuel, ash produced per ton of fuel burnt is 6.5 Kg.

(c) **For captive power D.G. set:**

Capacity of D.G. set	Chimney height above roof/ridge level
0-100 KVA	H + 3 meters.
100-300 KVA	H + 5 meters.
300-400 KVA	H + 6 meters.
400-500 KVA	H + 7 meters.
Greater than 500 KVA	As per formula**

** $H = 14(Q)^{0.3}$, where Q is Total Sulphur-di-oxide based on total diesel used.

For producing 1 KVA power, diesel required is 200 Grams per hour.

CHIMNEY HEIGHT CALCULATION FOR BOILER

Energy required for generation of one tonne of steam = $750x10^3$ kcal

Total energy requirement for (X) TPH boiler : (X) x 750x1000

A) Bagasse fired boiler :

Heat supply through bagasse : **(X)** x750x1000 kcal.

Quantity of bagasse required based on the

Calorific value of 3000kcal / kg (on dry basis) : **(X)** x750x1000 / 3000x1000 tonne / hr

Total ash generation : **(X)** x750x1000 / 3000 x 1000 x 0.9/100 MT/hr (Q)

(Ash Content in bagasse : 0.9%)

Stack height requirement : $H = 74 (Q)^{0.27}$ mts.

OR

Considering bagasse requirement; One tonne of bagasse produce 2.2 tonne of steam

Total bagasse requirement. : (X) / 2.2 tone /hr

Ash production 6.5 Kg / tone of bagasse

Q = (X) / 2.2 tonne / hr x 6.5/1000 tonne / hr.

$H = 74\ Q^{0.27}$

$H = 74\ [(X) / 2.2 \text{ tonne / hr} \times 6.5/1000 \text{ tonne}]^{0.27}$ mts.

B) Bagasse and Coal combination :

Assuming heat supply : 95% through Bagasse+5% through imported coal

(a) Heat supply through bagasse : 95/100x(**X**) x750x1000kcal

Quantity of bagasse required based on Calorific value of 3000 kcal/kg (dry basis) : $\frac{95/100x(\mathbf{X})\ x750x1000 \text{ kcal}}{3000x1000}$

= (Y) MT/hr

(b) Heat Supply through imported coal : 5/100x1000 kcal

(c) Quantity of imported coal required based on Calorific value of 6000 kcal/kg = $\frac{5/100x(\mathbf{X})\ x750x1000 \text{ kcal}}{6000x1000}$

= (Y_1) t/hr

TOTAL ASH GENERATION : $Y \times 0.9/100 + Y_1 \times 15/100 = Z$ MT/hr (Q)

(Ash Content in bagasse : 0.9%)

(Ash content in imported coal : 15%)

Stack height requirement without any pollution control enquipment.

$H=74\ Q^{0.27}$ (H in meter)

Location of monitoring porthole in the chimney:

Location of the porthole shall be 8 times the diameter of the stack of duct downstream and 2 times the diameter upstream from any source of flow disturbance, such as bend expansion, construction wall, fitting or visible flame.

For rectangular stack, equivalent diameter is calculated using the formula -

$$\text{Equivalent diameter} = \frac{2(\text{length} \times \text{width})}{(\text{length} + \text{Width})}$$

Diameter of the porthole shall not be less than 75 mm with arrangement for closing the porthole when it is not in use.

An easily accessible platform to accommodate monitoring personnel and equipment shall be provided near the porthole with electric outlet point 230V/15A.

5. ENVIRONMENTAL STANDARDS

5.1. CHARACTERISTICS OF DRINKING WATER

Sl. No.	Parameters	Prescribed by			
		BIS (IS 10500-91)		ICMR	
		Desirable Limit	Max. permissible Limits in the absence of alternate source	Desirable Limit	Max. Permissible limits
1	2	3	4	5	6
1.	pH	6.5 to 8.5	No relaxation	7.0 - 8.5	6.5 - 9.2
2.	Total dissolved solids mg/L	500	2000	500	1500-3000
3.	Total hardness as $CaCO_3$ mg/L	300	600	300	600
4.	Calcium as Ca mg/L	75	200	75	200
5.	Magnesium as Mg mg/L	30	100	50	-
6.	Chloride as Cl mg/L	250	1000	200	1000
7.	Sulphate as SO_4 mg/L	200	400	200	400
8.	Nitrate as NO_3 mg/L	45	100	20	100
9.	Iron as fe mg/L	0.3	1	0.1	1
10.	Fluoride as F mg/L	1	1.5	1	1.5
11.	Arsenic as AS mg/L	0.05	0.05	-	0.05
12.	Manganese as Mn mg/L	0.1	0.3	0.1	0.5
13.	Zinc as Zn mg/L	5	15	0.1	5
14.	Copper as Cu mg/L	0.05	1.5	0.05	1.5
15.	Chromium as Cr mg/L	0.05	0.05	-	-
16.	Lead as Pb mg/L	0.05	0.05	-	0.5
17.	Mercury as Hg mg/L	0.001	0.001	-	0.001
18.	Cadmium as Cd mg/L	0.01	0.01	-	0.01
19.	Cyanide as CN mg/L	0.05	0.05	-	0.05
20.	Minerals Oil mg/L	0.01	0.03	-	-
21.	Phenolic compounds mg/L	0.001	0.002	-	-
22.	Total Colifom MPN/100 ml	1	10	-	-
23.	Residual free chlorine mg/L	0.2	-	-	-
24.	Aluminium as Al mg/L	0.03	0.2		
25.	Boron as B mg/L	1	5		
26.	Selenium as Se mg/L	0.01	-		
27.	Festicdes	Absent	0.001		

(b) World Health Organization Standards & European Union Standards

The EU standards are more recent (1998), complete and strict than the WHO standards (1993)

Some examples are :

- Bromate (Br) : Not mentioned by theWHO, 0.01 mg/l guideline in the EU standards.
- Manganese (Mn) : Guideline reduced from 0.5 to 0.05 mg/l.
- Cyanide (CN) : Guideline reduced from 0.07 to 0.005 mg/l.

But in some cases the EU guidelines are less strict than the WHO's :

- Cadmium (Cd) : Guideline rised from 0.003 to 0.005 mg/l.

Here is a comparative table of both WHO and EU standards :

	WHO standards 1993	**EU standards 1998**
Suspended solids	No guideline	Not mentioned
COD	No guideline	Not mentioned
BOD	No guideline	Not mentioned
Oxidisability		5.0 mg/l O2
Grease/oil	No guideline	Not mentioned
Turbidity	No guideline(1)	Not mentioned
pH	No guideline(2)	Not mentioned
Conductivity	250 microS/cm	250 microS/cm
Color	No guideline(3)	Not mentioned
Dissolved oxygen	No guideline(4)	No mentioned
Hardness	No guideline(5)	Not mentioned
TDS	No guideline	Not mentioned
cations (positive ions)		
Aluminium (AI)	0.2 mg/l	0.2 mg/L
Ammonia (NH_4)	No guideline	0.50 mg/L
Antimony (Sb)	0.005 mg/L	0.005 mg/L
Arsenic (As)	0.01 mg/L	0.01 mg/L
Barium (Ba)	0.3 mg/L	Not mentioned
Berillium (Be)	No guideline	Not mentioned
Boron (B)	0.3 mg/L	1.00 mg/L
Bromate (Br)	Not mentioned	0.01 mg/L
Cadmium (Cd)	0.003 mg/L	0.005 mg/L
Chromium (Cr)	0.05 mg/L	0.05 mg/L
Copper (Cu)	2 mg/L	2.0 mg/L
Iron (Fe)	No guideline(6)	0.2
Lead (Pb)	0.01 mg/L	0.01 mg/L
Manganese (Mn)	0.5 mg/L	0.05 mg/L
Mercury (Hg)	0.001 mg/L	0.001 mg/L
Molibdenum (Mo)	0.07 mg/L	Not mentioned
Nickel (Ni)	0.02 mg/L	0.02 mg/L

Nitrogen (total N)	50 mg/L	Not mentioned
Selenium (Se)	0.01 mg/L	0.01 mg/L
Silver (Ag)	No guideline	Not mentioned
Sodium (Na)	200 mg/L	200 mg/L
Tin (SN) inorganic	No guideline	Not mentioned
Uranium (U)	1.4 mg/L	Not mentioned
Zinc (Zn)	3 mg/L	Not mentioned
anions		
(negative ions)		
Chloride (CI)	250 mg/L	250 mg/L
Cyanide (CN)	0.07 mg/L	0.05 mg/L
Fluoride(F)	1.5 mg/L	1.5 mg/L
Sulfate (SO_4)	500 mg/L	250 mg/L
Nitrate (NO_3)	(See Nitrogen)	50 mg/L
Nitrite (NO_2)	(See Nitrogen)	0.50 mg/L
Microbiological parameters		
Escherichia coli	Not mentioned	0 in 250 ml
Enterococci	Not mentioned	0 in 250 ml
Pseudomonas		
aeruginosa	Not mentioned	0 in 250 ml
Clostridium		
perfringens	Not mentioned	0 in 100 ml
Coliform bacteria	Not mentioned	0 in 100 ml
Colony count 22°C	Not mentioned	100/ml
Colony count 37°C	Not mentioned	20/ml
other parameters		
Acrylamide	Not mentioned	0.0001 mg/L
Benzene (C_6H_6)	Not mentioned	0.001 mg/L
Benzo (a) pyrene	Not mentioned	0.00001 m/L
Chlorine dioxide (CIO_2)	0.4 mg/L	
1, 2-dichloroethane	Not mentioned	0.003 mg/L
Epichlorohydrin	Not mentioned	0.0001 mg/L
Pesticides	Not mentioned	0.0001 mg/L
Pesticides - Total	Not mentioned	0.0005 mg/L
PAHs	Not mentioned	0.0001 mg/L
Tetrachloroethene	Not mentioned	0.01 mg/L
Trichloroethene	Not mentioned	0.01 mg/L
Trihalomethanes	Not mentioned	0.1 mg/L
Tritium (H_3)	Not mentioned	100 Bq/L
Vinyl chloride	Not mentioned	0.0005 mg/L

(1) Desirable : Less than 5 NTU
(2) Desirable : 6.5-8.5
(3) Desirable : 15 mg/L Pt-Co
(4) Desirable : less than 75% of the saturation concentration
(5) Desirable : 150-500 mg/L
(6) Desirable : 0.3 mg/L

5.2. PRIMARY WATER QUALITY CRITERIA FOR BATHING WATER

(Water used for organized outdoor bathing)

In a water body or its part, water is subjected to several types of uses. Depending on the types of uses and activities, water quality criteria have been specified to determine its suitability for a particular purpose. Among the various types of uses there is one use that demands highest level of water quality or purity and that is termed as "Designated Best Use" in that stretch of water body. Based on this, water quality requirements have been specified for different uses in terms of primary water quality criteria. The primary water quality criteria for bathing water are specified along with the rationale.

Criteria		Rationale
1. Fecal Coliform MPN/100 ml	500 (desirable) 2500 (Maximum Permissible)	To ensure low sewage contamination. Fecal coliform and fecal streptococci are considered as they reflect the bacterial pathogenicity.
2. Fecal Streptococci MPPN/100 ml;	100 (desirable) 500 (Maximum Permissible)	The desirable and permissible limits are suggested to allow for fluctuation in environmental conditions such as seasonal change, changes in flow conditions etc.
3. pH	Between 6.5 - 8.5	The range provides protection to the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing.
4. Dissolved Oxygen	5 mg/l or more	The minimum dissolved oxygen concentration of 5 mg/l ensures reasonable freedom from oxygen consuming organic pollution immediately upstream which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediment.
5. Biochemical Oxygen demand 3 day, 27^{0}C;	3 mg/l or less	The Biochemical Oxygen Demand of 3 mg/l or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases.

5.2.1. PRIMARY WATER QUALITY CRITERIA FOR VARIOUS USES LAID DOWN BY CENTRAL POLLUTION CONTROL BOARD

Sl. No.	Characteristics	A*	B*	C*	D*	E*
1	Dissolved Oxygen (D.O.) mg/L, min.	6	5	4	4	-
2	Biochemical Oxygen Demand (B.O.D.) mg/L, max	2	3	3	-	-
3	Total Coliform Organisms**, MPN/100 ml, max	50	500	5000	-	-
4	pH value	6.5-8.5	6.5-8.5	6.9	6.5-8.5	6-8.5
5	Free Ammonia (as N), mg/L, max	-	-	-	1.2	-
6	Electrical Conductivity, Micro-mhos/cm, max	-	-	-	-	2,250
7	Sodium Absorption Ratio, max	-	-	-	-	26
8	Boron, mg/L, max	-	-	-	-	2
9	Sulphates (as SO4) mg/L, max	400	-	400	-	1000
10	Nitrates (as No4), mg/L, max	20	-	50	-	-
11	Free Ammonia (as NH3), mg/L, max	-	-	-	1.2	-
12	Conductivity at 250C, Micromhos/cm, max	-	-	-	1000	2250
13	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-8.5
14	Arsenic (as As), mg/L, max	0.05	0.2	0.2	-	-
15	Iron (as Fe), mg/L, max	0.3	-	50	-	-
16	Flourides (as F), mg/L, max	1.5	1.5	1.5	-	-
17	Lead (as Pb), mg/L, max	0.1	-	0.1	-	-
18	Copper (as Cu), mg/L, max	1.5	-	1.5	-	-
19	Zinc (as Zn), mg/L, max	15	-	15	-	-

* Use classes (A) Drinking water source without conventional treatment but after disinfection, (B) Out door bathing organized, (C) Drinking water source with conventional treatment followed by disinfection, (D) Propagation of wildlife, fisheries, (E) Irrigation, industrial cooling, controlled waste disposal.

** If the Coliform count is found to be more than the prescribed tolerance limits, the criteria for Coliforms shall be satisfied if not more than 20 percent of samples show more than the tolerance limits specified, and not more than 5 percent of samples show values more than 4 times the tolerance limits. Further, the Fecal Coliform should not be more than 40 percent of the total coliform. (Source: Indian Standard IS:2296-1982)).

5.3 GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS

Sl No	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
(1)	(2)	(3)	(4)	(5)	(6)
1.	Colour and odour	See Note 1	-	See Note 1	See Note 1
2.	Suspended Solids mg/L,	100 max	600	200	a. For process wastewater 100 b. For cooling water effluent 10 percent above total suspended matter of influent.
3.	Particle size of Suspended Solids	Shall pass 850 micron IS Sieve	-	-	a. Floatable solids, max.3mm b. Settleable solids, max 850 microns.
4.	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5.	Temperature	Shall not exceed 50°C above the receiving water temperature	-	-	Shall not exceed 50°C above the receiving water temperature
6.	Oil and grease mg/L Max	10	20	10	20
7.	Total residual chlorine mg/L Max	1.0	-	-	1.0
8.	Ammonical nitrogen (as N), mg/L Max	50	50	-	50
9.	Total Kjeldahl nitrogen (as NH_3), mg/L, Max	100	-	-	100
10.	Free Ammonia (as NH_3) mg/L, Max	5.0	-	-	5.0
11.	Biochemical Oxygen demand (3 days at 27°C), mg/L, Max	30	350	100	100

12.	Chemical Oxygen demand, mg/L, Max	250	-	-	250
13.	Arsenic (as As), mg/L, Max	0.2	0.2	0.2	0.2
14.	Mercury (As Hg), mg/L, Max	0.01	0.01	-	0.01
15.	Lead (as Pb), mg/L, Max	0.1	1.0	-	2.0
16.	Cadmium (as Cd), mg/L, Max	2.0	1.0	-	2.0
17.	Hexavalent chromium (as Cr^{+6}), mg/L, Max	0.1	2.0	-	1.0
18.	Total Chromium (as Cr) mg/L, Max	2.0	2.0	-	2.0
19.	Copper (as Cu) mg/L, Max	3.0	3.0	-	3.0
20.	Zinc (as Zn) mg/L, Max	5.0	15	-	15
21.	Selenium (as Se) mg/L, Max	0.05	0.05	-	0.05
22.	Nickel (as Ni) mg/L, Max	3.0	3.0	-	5.0
23.	Cyanide (as CN) mg/L, Max	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/L, Max	2.0	15	-	15
25.	Dissolved phosphates (as P), mg/L, Max	5.0	-	-	-
26.	Sulphide (as S) mg/L, Max	2.0	-	-	5.0
27.	Phenolic compounds (as C_6H_5OH) mg/L, Max	1.0	5.0	-	5.0
28.	Radioactive materials (a.) Alpha emitter Micro curie/ml, Max (b.) Beta emitter Micro curie/ml, Max	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{-7}	10^{-7} 10^{-6}
29.	Bio assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish of after 96 hours in 100% effluent
30.	Manganese (as Mn)	2 mg/L	2 mg/L		2 mg/L
31.	Iron (as Fe	3 mg/L	3 mg/L		3 mg/L
32.	Vanadium (as V)	0.2 mg/L	0.2 mg/L		0.2 mg/L
33.	Nitrate Nitrogen	10 mg/L			20 mg/L
34.	Pesticides: (microgm per lit. maximum)				
	i) Benzene hexachloride	10	-	10	10
	ii) Carbaryl	10	-	10	10
	iii) DDT	10	-	10	10
	iv) Endosulfan	10	-	10	10

	v) Diamethoate	450	-	450	450
	vi) Penitrothion	10	-	10	10
	vii) Malathion	10	-	10	10
	viii) Phorate	10	-	10	10
	ix) Methyl Parathion	10	-	10	10
	x) Phenthoate	10	-	10	10
	xi) Pyrethrums	10	-	10	10
	xii) Copper Oxchloride	9600	-	9600	9600
	xiii) Copper Sulphate	50	-	50	50
	xiv) Ziram	1000	-	1000	1000
	xv) Sulphur	30	-	130	30
	xvi) Paraouat	2300	-	2300	2300
	xvii) Proponil	7300	-	7300	7300
	xviii) Nitrogen	780	-	780	780

Note:

1. All efforts should be made to remove colour and unpleasant odour as far as practicable.

Loading rate of treated effluent on land for irrigation

Sl.No.	Soil texture	Loading rate in M^3/Hec/Day
1.	Sandy	225 to 280
2.	Sandy Loam	170 to 225
3.	Loam	110 to 170
4.	Clay Loam	55 to 110
5.	Clayey	35 to 055

5.4. NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Time Weighted average	Concentration in ambient air			Method of measurement
		Industrial Rural & Other areas	Residential Area	Sensitive Area	
Sulphur (SO_2)	Annual Average* dioxide	80 $\mu g/m^3$	60 $\mu g/m^3$	15 $\mu g/m^3$	Improved West & Greke method
	24 Hours**	120 $\mu g/m^3$	80 $\mu g/m^3$	30 $\mu g/m^3$	Ultraviolet fluorescence.
Oxides of Nitrogen as NO2	Annual Average*	80 $\mu g/m^3$	60 $\mu g/m^3$	15 $\mu g/m^3$	Jacob & Hochheiser modified (Na-Arsenite) method
	24 hours**	120 $\mu g/m^3$	80 $\mu g/m^3$	30 $\mu g/m^3$	Gas Phase Chemilumine scence.
Suspended Particulate Mater (SPM)	Annual Average*	360 $\mu g/m^3$	140 $\mu g/m^3$	70 $\mu g/m^3$	High volume sampling (Average flow rate not less than 1.1 m^3/minute)
	24 hours**	500 $\mu g/m^3$	200 $\mu g/m^3$	100 $\mu g/m^3$	
Respirable Particulate Matter (size less than 10 μm) (RPM)	Annual Average*	120 $\mu g/m^3$	60 $\mu g/m^3$	50 $\mu g/m^3$	Respirable particulate matter sampler
	24 hours**	150 $\mu g/m^3$	100 $\mu g/m^3$	75 $\mu g/m^3$	
Lead (Pb)	Annual Average*	1.0 $\mu g/m^3$	0.75 $\mu g/m^3$	0.50 $\mu g/m^3$	AAS method after sampling using EPM 2000 or equivalent Non dispersive infrared spectroscopy
	24 hours**	1.5 $\mu g/m^3$	1.00 $\mu g/m^3$	0.72 $\mu g/m^3$	
Carbon Monoxide hour	8 hours**	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3	
	1 hours	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3	

** 24 hourly/8 hourly values should be met 98% of the time in a year. However 2% of the time, it may exceed but not on two consecutive days.

* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals.

Note:

1. National Ambient Air Quality Standard: The levels of air quality necessary with an adequate margin of safety, to protect the public health, vegetation and property.
2. Whenever and wherever two consecutive values exceeds the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations.

5.5 INDUSTRY SPECIFIC STANDARDS

1. All effluent parameter concentrations (except pH, SAR, bioassay, color, temperature) are expressed in mg/l unless units are specifically mentioned against the parameter.
2. All emission parameter concentrations are expressed in mg/Nm^3 unless units are specifically mentioned against the parameter.

5.5.1. CHLOR ALKALI (CAUSTIC SODA):

Wastewater discharge standards

Parameter	Concentration not to exceed Limits,
Total concentration of mercury in the final effluent*	0.01
Mercury bearing wastewater generation (flow)	10 kl/tonne of caustic soda produced
pH	5.5 to 9.0
Membrane cell process	1m^3/tonne of product excluding cooling water blow down
Mercury cell process	4m^3/tonne of product (mercury bearing) 10% blow down permitted for cooling tower

* Final effluent is the combined effluent from (a) Cell house; (b) Brine plant; (c) Chlorine handling; (d) Hydrogen handling and (e) Hydrochloric acid plant.

Emission Standards

Process	Pollutants	Emission limit
a) Mercury cell	Mercury (from hydrogen gas holder stack)	0.2
b) All processes	Chlorine (from hypo tower)	15
c) All processes	Hydrochloric vapour and mist from (hydrochloric acid plant)	35

5.5.2 MAN MADE FIBER

Wastewater discharge standards

Process	Parameter	Concentration not to exceed
Synthetic	Suspended solids BOD, (3 days at 27°C) pH	100 30 5.5 to 9.0
Semi-synthetic	pH Suspended solids BOD, (3 days at 27°C) Zinc (as Zn)	5.5 - 9.0 100 30 1
Waste water generation a. viscose staple fibre. b. man made fibre viscose Ryan	 150 m^3/ton of product 150 m^3/ton of product	

Emission Regulations for Rayon Industry.

(Semi-Synthetic)

(a) **Existing Plants**

Estimation of uncontrolled Emission Quantity (EQ) of CS_2

For VSF,

EQ = 125 kg of CS_2 /t of fiber

For VFY,

EQ = 225 kg of CS_2 /t of fiber

11 Q 0.41- 3 VsD/U	A minimum of 80% of total emission shall pass through stack. If the calculated stack height is less than 30 m, a minimum of height 30 m shall be provided.

Where Q - CS_2 emission rate, kg/hr

Vs = stack exit velocity, m/sec.

D = Diameter or stack, m

U = Annual average wind speed at top of stack, m/sec.

Multiple Stacks

1. If there are more than one stack existing in the plant, the required height of all stacks shall be based on the maximum emission rate in my of the stacks. In other words, all the stacks carrying CS2 emission shall be of same heights (based on the maximum emission rate).
2. Number of stacks shall not be increased from the existing number. However, the number of stacks may be reduced. The existing stacks may be shall be rebuilt and it stacks are to be relocated, condition 3 below applied.
3. Spacing among the stacks (x) at the minimum shall be 3.0 H (in m). If distance, x, between two stacks is less than 3.0 H (in m), emission shall be considered an single point source and height of both the stacks shall be calculated considering all emission is going through one stack.

(b) Ambient air quality monitoring

The industry shall install three air quality monitoring stations for CS_2 and H_2S measurements in consultation with State Pollution Control Board (SPCB) to ensure attainment of WHO recommended ambient air quality norms as-

CS_2 = 100 $\mu g/m^3$, 24-hr, average.
H_2S = 150 $\mu g/m^3$, 24-hr, average.

(c) For new plants/expansion projects being commissioned on or after 1.6.1999.

Permissible emission limits are:

CS_2 = 21 Kg/t of fiber
H_2S = 6.3 Kg/t of fiber

Note: (a) and (b) above also apply to new plants/expansion projects)

5.5.3. OIL REFINERY

Standards for liquid effluent

Parameter	Concentration not to exceed,	Quantum, kg/1000 tonne Crude processed not to exceed
Oil & grease	10	7
Phenol	1	0.7
Sulphide	0.5	0.35
Bio-chemical oxygen demand (3 days, 27°C)	15	10.5
Suspended solids	20	14
pH	6 to 8.5	--

Standards for Sulphur Dioxide

Process	Emission limit
Distillation (Atmospheric Plus Vacuum)	0.25 kg/tonne of feed
Catalytic Cracker	2.5 kg/tonne of feed
Sulphur Recovery Unit	120 kg/tonne of sulphur in the feed

Note:

All emissions normalized to 12% CO

Feed indicates the feed for that part of the process under consideration only

5.5.4. SUGAR INDUSTRY

Standards for liquid effluent

Parameter	Concentration not to exceed
Bio-chemical oxygen demand, (3 days at 27°C)	100 for disposal on land
Suspended solids	30 for disposal in surface waters 100 for disposal on land
Waste water generation	0.4 m^3/tonne of cane crushed

Note: Refer guidelines for sugar industry & CREP

5.5.5. THERMAL POWER PLANT

Standards for liquid effluents

Source	Parameter	Concentration not to exceed
Condenser Cooling Water (once through higher cooling system)	pH Temperature	6.5 to 8.5 Not more than 5°C than the higher intake water temperature
Boiler Blow down	Free available chlorine Suspended solids Oil & grease Copper (Total) Iron (Total)	0.5 100 20 1.0 1.0
Cooling Tower Blow down	Free available chlorine Zinc Chromium (Total) Phosphate Other corrosion inhibiting material	0.5 1.0 0.2 5.0 Limit to be established on case by case basis by Central Board in case of Union Territories and State Boards in case of States
Ash pond effluent	pH Suspended solids Oil & grease	6.5 to 8.5 100 20

Emission Standards

Generation Capacity	Pollutant	Emission limit
Generation capacity 210 MW or more	Pariculate matter	150 mg/Nm^3
Generation capacity less than 210 MW	Particulate matter	350 mg/Nm^3

* Depending upon the requirement of local situation, such as protected area, the State Pollution Control Boards and other implementing agencies under the Environment (Protection) Act, 1986, may prescribe a limit of 150 mg/Nm^3, irrespective of generation capacity of the plant.

Stack Height/Limits

Generation Capacity	Stack Height (metres)
500 MW and above	275
200 MW/210 MW and above to less than 500 MW	220
Less than 200 MW/210 MW kg/hr, and H is Stack height in metres. **Steam generating capacity**	H= 14 $Q^{0.3}$ where Q is emission rate of SO_2 in **Stack height**
Less than 2 ton/hr	2 ½ times the neighbouring building height or 9 meters (whichever is more)
More than 2 to ton/hr to 5 ton/hr	12
More than 5 ton/hr to 10 ton/hr	15

More than 10 ton/hr	18
More than 15 ton/hr to 20 ton/hr	15
More than 20 ton/hr to 25 ton/hr	24
More than 25 ton/hr to 30 ton/hr	27
More than 30 ton/hr	30 or using formula $H=14(Q)^{0.3}$ (whichever is more) Q where is emission rate of SO_2 in kg/hr and H is Stack height in meters.

Environmental Standards For Gas / Naptha Based Thermal Power Plants

(i) Limit for emission of NOx

(a) For existing units - 150 ppm (v/v) at 15% excess oxygen.

(b) For new units with effect from 1-6-99.

(c) For the plants burning gas in a conventional

Total generation of gas turbine	**Limit for Stack NOx emission (v/v), at 15%**
excess oxygen)	
(a) 400 MW and above	(i) 50 ppm for the units burning natural gas.
	(ii) 100 ppm for the units burning naphtha
(b) Less than 400 MW but upto 100 MW	(i) 75 ppm for the units burning natural gas
	(ii) 100 ppm for the units burning naphtha
(c) Less than 100 MW	100 ppm for units burning natural gas or naphtha as fuel
(d) Forthe plants burning gas in a conventional boiler.	100 ppm

(ii) Stack height H in m should be calculated using the formula $H= 14\ Q^{0.3}$, where Q is the emission of SO_2 in kg/hr, subject to a minimum of 30 mts.

(iii) Liquid waste discharge limit

Parameter	**Maximum limit of concentration**
pH	6.5 - 8.5
Temperature	As applicable for other thermal power plants Free available chlorine
Free available chlorine	0.5
Suspended solids	100.0
Oil & grease	20.0
Copper (total)	1.0
Iron (total)	1.0
Zinc	1.0
Chromium (total)	0.2
Phosphate	5.0

Temperature limit for discharge of condenser cooling water from Thermal Power Plant

A. New thermal power plants commissioned after June 1, 1999.

New thermal power plants, which will be using water from rivers/lakes/reservoirs, shall install cooling towers irrespective of location and capacity. Thermal power plants which will use sea water for cooling purposes, the condition below will apply.

B. New projects in coastal areas using sea water.

The thermal power plants using sea water should adopt suitable system to reduce water temperature at the final discharge point so that the resultant rise in the temperature of receiving water does not exceed 7^0C over and above the ambient temperature of the receiving water bodies.

C. Existing thermal power plants.

Rise in temperature of condensor cooling water from inlet to the outlet of condenser shall not be more than 10^0C.

D Guidelines for discharge point:

1. The discharge point shall preferably be located at the bottom of the water body at midstream for proper dispersion of thermal discharge.
2. In case of discharge of cooling water into sea, proper marine outfall shall be designed to achieve the prescribed standards. The point of discharge may be selected in consultation with concerned State Authorities/NIO.
3. No cooling water discharge shall be permitted in estuaries or near ecologically sensitive areas such as mangroves, coral reefs/spawning and breeding grounds of aquatic flora and fauna.

5.5.6. DYE & DYE INTERMEDIATE INDUSTRY

a. Concentration industries

Wastewater Discharge Standards :

Parameter	Concentration not to exceed,
pH	6.0-8.5
Temperature	Shall not exceed 5^0C above the ambient temperature of the receiving water body
Suspended solids	100
Mercury(as Hg)	0.01
Oil & Grease	10.0
Phenolics compounds (as C_6H_5OH)	1.0
Cadmium as Cd	2.0
Copper as Cu	3.0
Zinc (as Zn)	5.0
Nickel (as Ni)	3.0
Chloride (as Cl)	1000
Sulphate (as SO_4)	1000
Hexavalent Chromium (as Cr)	0.1
Total Chromium (as Cr)	2.0

Bioassay test (with 1:8 effluents) dilution of 90% survival of test animals after 96 hours

The standards for chlorides and sulphates are applicable for discharge into inland and surface watercourses. However, when discharged on land for irrigation, limit for chloride shall not be more than 600 milligrams per liter and the sodium absorption ratio shall not exceed 26

b. Intermediate Industry

Parameter	Concentration not to exceed
pH	6.0-8.5
Colour Hazen unit	400.0
BOD @ 3days 27°C	100
Suspended solids	100
Mercury(as Hg)	0.01
Oil & Grease	10.0
Phenolics compounds (as C_6H_5OH)	1.0
Cadmium as Cd	0.2
Copper as Cu	2.0
Zinc (as Zn)	5.0
Nickel (as Ni)	2.0
Lead (as Pb)	0.1
Manganese (as Mn)	2.0
Hexavalent Chromium (as Cr)	0.1
Total Chromium (as Cr)	2.0
Bioassay test	90% survival in 96 hours

5.5.7. ELECTROPLATING INDUSTRY:

Wastewater Discharge Standards

Parameter	Concentration not to exceed
pH	6.0 to 9.0
Temperature temperature of the receiving body	should not exceed 5°C above the ambient
Oil & grease	10
Suspended solids	100
Cynaides (as 'CN')	0.2
Ammonical nitrogen (as N)	50
Total residual chlorine (as Cl2)	1.0
Cadmium (as Cd)	2.0
Nickel (as Ni)	3.0
Zinc (as Zn)	5.0
Hexavalent Chromium (as Cr)	0.1
Total Chromium (as Cr)	2.0
Copper (as Cu)	3.0
Lead (as Pb)	0.1
Iron (as Fe)	3.0
Total Metal	10.0

5.5.8. CEMENT INDUSTRY:

Emission Standards

Plant Capacity	Pollutants	Emission limit (mg/Nm^3)
200 tonnes per day and less	Particulate Matter (All Sections)	400
More than 200 tonnes per day	Particulate Matter (All Sections)	250

Emissions

(i) For Cement Plants, including Grinding Units, located in critically polluted* or urban areas with a population of one lakh and above (including 5 Km distance outside urban boundary):

Particulate matter 100mg/Nm3

(ii) New Cement Kilns, including Grinding Units to be installed after the date of notification:

Particulate matter $50mg/Nm^3$

* As per the guidelines of the Central Pollution Control Board";

Note:

(1) The Central and the State pollution control boards may fix stringent standards not exceeding 250 mg/Nm^3 for smaller plants and 150 mg/Nm^3 for larger plant the industry is located in an area which, in their opinion, requires more stringent standards.

(2) Where continuous monitoring equipments are provided on dust emission lines the integrated average values over a period, to be fixed by the central and state boards but not exceeding 72 hours shall be considered instead of momentary dust emission value conformity to standards.

5.5.9. COKE OVENS

Wastewater Discharge Standards

Parameter	Concentration in the effluent when discharged into inland surface water not to exceed,
pH	5.5 to 9.0
Biochemical oxygen demanddays (27^0C, 3 days)	30
Suspended solids	100
Phenolic componds (as C_6H_5OH)	5
Cyanides (as CN)	0.2
Oil & grease	10
Ammonical nitrogen (as N)	50

Coke Oven Plants (by product recovery type)

	New Batteries (at Green field Site	Rebuild Batteries	Existing Batteries
Fugitive Visible Emissions			
(a) Leakage from door	5 (PLD)*	10(PLD)*	10(PLD)*
(b) Leakage from charging lids	1 (PLL)*	1 (PLL)*	1 (PLL)*
(C) Leakage from AP Covers	4 (PLO)*	4 (PLO)*	4(PLO)*
(d) Charging emission (Second/charge)	16 (with HPLA)*	50 (with HPLA)*	75
Stack Emission of Coke Oven			
(a) SO_2 (mg/Nm^3)	800	800	800
(b) NOx (mg/Nm^3)	500	500	500
(c) SPM (mg/Nm^3)	50	50	50
(d) SPM emission during charging - for stamp charging batteries (stack emission mg/Nm^3)	25	25	25
(e) SPM emission during coke pushing (stack emission) gm/ton of coke	5	5 (applicable to stationary land based system)	-
(f) Sulphur in Coke Oven gas used for heating (mg/Nm^3)	800	-	-
Emission for quenching operation			
(a) Particulate matter gm/tonne of coke produced	50	50	-
Benzo-Pyerine (BaP) concentration in work zone air (ug/m^3)			
(a) Battery area (top of the battery)	5	5	5
(b) Other units in coke oven plant	2	2	2
(C) Ambient air standards (mg/Nm^3)	10	10	10

For control of emissions and to maintain environmental quality in work zone area, the following guidelines shall be followed, namely:

(i) New coke oven units shall follow any of the low-emission procedures, such as, coke dry cooling, non-recovery coke-ovens, Indirect Quenching Process, Jumbo coke oven reactor, Modified Wet Quenching system with appropriate environmental controls (e.g. baffles, filtering media, collection and treatment of residual water from quench tower and recycling; Treated effluent conforming to the effluent discharge standards can be used for quenching. Use of untreated process water as quenching water shall not be permissible).

(ii) Effective pollution control measures e.g. Extensive maintenance and cleaning of oven doors and frame seals, ascension pipes, charging holes and lids and other equipment; On-main charging system (HPLA);

Luting charging holes with clay-suspension; Modified guide/transfer car with emission control system etc. shall be used to reduce coal charging and coke pushing emissions.

(iii) During rebuilding or installing new coke oven batteries, the following clean technology and pollution control measures be adopted;

(a) air cooled self-sealing doors;

(b) the hydro-jet cleaning system shall be provided for the door and door frame cleaning with a facility of hydro jet pressure of 600 kg/cm^2;

(c) the charging should be accomplished with hermetically sealed charging sleeves and screw feeder in charging car. The charging car should also be equipped with magnetic lid lifter and lid and frame cleaning mechanism (applicable to top charging batteries);

(d) to provide aspiration through high-pressure ammonia liquor (HPLA) injection in goose neck and emission should be transferred directly to gas collecting mains;

(e) water sealed AP covers should be provided;

(f) computerized combustion control and moisture control systems.

(iv) In addition to the above the new coke oven batteries, which will be installed after the date of publication of this notification at green field site and rebuild batteries wherever technically feasible should also be equipped to treat their pushing emissions with stationary land-based system with collection hold and wet scrubbing units for gas cleaning.

(v) In the case of existing coke ovens with wet quenching, the new procedures as in (i) and (ii) shall be adopted.

(vi) The fugitive visible emission standards i.e. PLD*, PLL* and PLO*, charging emission (second/charge)

Note : Units set up after the publication of this notification shall be treated as new units.

*HPLA - Aspiration through high pressure liquor injection in gooseneck;

*PLD- Percent leaking doors;

*PLL - Percent leaking lids; and

*PLO- Percent leaking off takes

5.5.10. BEEHIVE HARD COKE OVEN

	Pollutant	**Emission limit**
New Unit	Particulate Matter (corrected to 6% CO_2)	150 mg/Nm^3
Existing unit	Particulate Matter (corrected to 6% CO_2)	350 mg/Nm^3

Note: For control of emissions and proper dispersion of pollutants, the following guidelines shall be followed:

- Units set up after the publication of this notification shall be treated as new units.
- A minimum stack height of 20 metre shall be provided by each unit.
- Emissions from coke ovens shall be channelised through a tunnel and finally emitted through a stack. Damper adjustment techniques shall be used to have optimum heat utilisation and also to control the emission of unburnt carbon particles and combustible flue gases.
- Wet scrubbing system or waste heat utilisation for power generation or byproduct recovery systems should be installed preferably to achieve the prescribed standards.
- After four years from the date of this notification, all the existing units shall comply with the standards prescribed for the new units.

5.5.11. SMALL PULP & PAPERINDUSTRY

Standards for Liquid Effluents

Mode of Disposal	Parameter	Concentration not to exceed,
Inland Surface Water	pH Suspended solids BOD at 27°C, 3 days	5.5 to 9.0 100 30
On Land	pH Suspended solids BOD at 27°C, 3 days Sodium absorption ratio	5.5 to 9.0 100 100 26

Waste Water Discharge Standards*

CATEGORY	Quantity
A: Agrobased *	200 cum/tonne of paper produced
B: Waste Paper Based **	75 cum/tonne of paper produced

* The agrobased mill to be established from January, 1992 will meet the standards of 150 cum/tonne of paper produced.

** The waste paper mills to be established from January, 1992 will meet the standards of 50 cum/tonne of paper produced.

Explanation : These standards shall apply to all small scale pulp & paper mills having capacity below 24,000MT/annum

5.5.12. LARGE PULP & PAPER

(News Print/Rayon Grade Plants Of Capacity Above 24,000 Tonne/Annum)

Wastewater Discharge Standards

Parameter	Flow/Concentration not to exceed
(i) (Large pulp & paper) Total waste water discharge	175 cum/tonne of paper
(ii) (Large rayon grade/news print) Total waste water discharge	150 cum/tonne of paper
pH	7 to 8.5
SS	50 mg/l
BOD 3 days @ 27°C	30 mg/l

COD	350 mg/l
Absorbable Oragnic Halogens (AOX)	1.5 kg/tonne of product with effect from 30-8-2005 and from 1-3-2008, 1 kg/tone of product
Total waste water discharge	200 CUM/tone of paper produced.

Note: The standards with respect to total waste water discharge for large pulp and paper mills to be established from 1992 will meet the standards of 100 Cum per tone of paper produced.

Emission Standards Parameter	**Concentration in mg/Nm^3**
Particulate Matter	150
H_2S	10

5.5.13. FERMENTATION INDUSTRY

(Distilleries, Maltries & Breweries)

Wastewater Discharge Standards

Parameter	**Concentration in the effluent not to exceed**
pH	5.5 to 9.0
Colour & odour	All efforts should be made to remove colour and unpleasant odour as far as practicable
Suspended solids	100
BOD 3 days @ 27°C -disposal into inland surface water/ river/streams	30
-disposal on land or for irrigation	100

Note : Also refer guidelines for distillery industries

5.5.14. TANNERY

Effluent Standards

Pollutant	**Concentration**	**Quantum per raw hide Processed**
pH	6.5-9.0	-
*BOD (at 27°C, 3 days)	100	-
Suspended solids	100	-
Sulphides (as S)	1	-
Total chromium (as Cr)	2	-
Oil and grease	10	-
Wastewater generation	-	28 m^3/tonne

* For effluent discharged into inland surface waters BOD limit shall be made stricter to 30 mg/l by the concerned State Pollution Control Board.

Effluent standard (after primary treatment): disposal channel/conduit carrying wastewater to secondary treatment plant

Type of tanneries	Parameter	Concentration limit not exceed,
pH	6.5 to 9.0	
Chrome tanneries/combined chrome & vegetable tanneries	SS Chromium concentration after treatment in the chrome waste water stream	Not to exceed 600 45
Vegetable tanneries	pH	6.5 to 9.0
	SS	Not to exceed 600

*Note: The above standards will apply to those tannery units which have made full contribution to a Common Effluent Treatment (CETP) comprising secondary treatment.

5.5.15. LEATHER TANNERIES

Wastewater Discharge Standards

Parameter	Concentration in the effluent not to exceed, /Mode of disposal			
	Inland surface water	Public sewer	Land for irrigation	Marine coastal areas
Suspended solids	100	600	200	100
BOD, 3 days at 27°C	30	350	100	100
pH	6.0 to 9.0	6.0 to 9.0	6.0 to 9.0	6.0 to 9.0
Chlorides as (Cl)	1000	1000	600	-
Chromium hexavalent	0.1	0.2	0.1	0.1
total Chromium	2.0	2.0	2.0	2.0
Sulphides (as S)	2.0	5.0	-	5.0
Sodium percent	-	60	60	-
Boron (as B)	2.0	2.0	2.0	-
Oil & grease	10	20	10	20

5.5.16 FERTILISER INDUSTRY

Straight Nitrogenous Fertiliser Industry :

(Excluding the Calcium Ammonium Nitrate and Ammonium Nitrate Fertiliser)

Wastewater Discharge Standards

Parameter	Concentration not to exceed,	
	Plants commissioned	
	January 1, 1982 onwords	prior to January 1, 1982
pH	6.5 to 8.0	6.5 to 8.0
Ammonical nitrogen	50	75
Total kjeldahl nitrogen (TKN)	100	150
Free ammonical nitrogen	4	4

Nitrate nitrogen	10	10
Cyanide as CN	0.2	0.2
Vanadium as V	0.2	0.2
Arsenic as As	0.2	0.2
Suspended solids	100	100
Oil & grease	10	10
Chromium as Cr		
hexavalent*	0.1	0.1
total Chromium	2.0	2.0

* To be complied with at the outlet of chrome removal unit.

Straight Nitrogenous Fertiliser Industry : (Including Calcium Ammonium Nitrate and Ammonium Nitrate Fertiliser)

Wastewater Discharge Standards

Parameter	**Concentration not to exceed, Plant commissioned**	
	January 1, 1982 onwords	prior to January 1, 1982
pH	6.5 to 8.0	6.5 to 8.0
Ammonical nitrogen	50	75
Total kjeldahl nitrogen (TKN)	100	150
Free ammonical nitrogen	4	4
Nitrate nitrogen	20	20
Cyanide as CN	0.2	0.2
Vanadium as V	0.2	0.2
Arsenic as As	0.2	0.2
Suspended solids	100	100
Oil & grease	10	10
Chromium as Cr		
hexavalent*	0.1	0.1
total Chromium	2.0	2.0

* Tobe complied with at the outlet of chrome removal unit.

Straight Phosphatic Fertiliser Industry :

Wastewater Discharge Standards

Parameter	**Concentration not to exceed**
pH	7.0 to 9.0
Phosphate as P	5
Oil & grease	10
Suspended solids	100
Fluorides as F*	10
Chromium as Cr**	
Hexavalent	0.1
Total Chromium	2.0

* Tobe complied with at the outlet of fluoride removal unit, if the recipient system so demands, fluoride as F shall be limited to 1.5 mg/l.

** To be complied with at the outlet of chromate removal unit.

Complex Fertilizer Industry:

(Including Calcium, Ammonium, nitrate and Ammonium phosphate fertilizers)

Wastewater Discharge Standards

Parameter	Concentration not to exceed, mg/l (except for pH)	
	Plants commissioned	
	January 1, 1982 onwords	prior to January 1, 1982
pH	6.5 to 8.0	6.5 to 8.0
Ammonical nitrogen	50	75
Free ammonical nitrogen	100	100
Nitrate nitrogen	20	20
Cyanide as CN	0.2	0.2
Vanadium as V	0.2	0.2
Arsenic as As	0.2	0.2
Phosphate as P	5	5
Oil & grease	10	10
Suspended solids	100	100
Fluoride as F*	10	10
Chromium as Cr**		
hexavalent*	0.1	0.1
total Chromium	2.0	2.0

* Tobe complied with at the outlet of fluoride removal unit, if the recipient system so demands, fluoride as F shall be limited to 1.5 mg/l.

** To be complied with at the outlet of chromate removal unit.

Complex Fertilizer Industry: (Excluding Calcium, Ammonium, nitrate and Ammonium phosphate fertilizers)

Parameter	Concentration not to exceed, mg/l (except for pH)	
	Plants commissioned	
	January 1, 1982 onwords	January 1, 1982
pH	6.5 to 8.0	6.5 to 8.0
Ammonical nitrogen	50	75
Total kjeldahl nitrogen (TKN)	100	150
Free ammonical nitrogen	4	4
Nitrate nitrogen	10	10
Cyanide as CN	0.2	0.2
Vanadium as V	0.2	0.2
Arsenic as As	0.2	0.2
Phosphate as P	5	5
Oil & grease	10	10
Suspended solids	100	100
Fluoride as F*	10	10
Chromium as Cr**		
hexavalent*	0.1	0.1
total Chromium	2.0	2.0

* To be complied with at the outlet of fluoride removal unit, if the recipient system so demands, fluoride as F shall be limited to 1.5 mg/l.

** To be complied with at the outlet of chromate removal unit.

Phosphatic Fertilizer: Emission Standards

Parameter	Source	Emission limit, mg/Nm^3
Total fluoride	Phosphoric acid manufacturing unit	25
Particulate Matter	Granulation, mixing and grinding of rock phosphate	150

Urea Plants

Year of Commissioning	Pollutants	Emission Limit
Prilling tower commissioned prior to 1.1.1982	Particulate Matter	150 mg/Nm^3 or 2 kg/tonne of Urea
Prilling tower commissioned after 1.1.1982	Particulate Matter	50 mg/Nm^3 of 0.5 kg-/tonne of Urea

5.5.17. SULPHURIC ACID PLANT

Parameters	Emission Limit
Sulphur dioxide	4 kg/tonne of concentrated (100% acid produced)
Acid mist	50 mg/Nm^3

5.5.18. NITRIC ACID PLANT

Emission standards

Parameters	Emission Limit
Oxides of nitrogen concentration produced).	3 kg of oxides of nitrogen per tonne of weak acid (before

5.5.19. INTEGRATED IRON & STEEL PLANT

Waste-water Discharge Standards

	Parameter	Concentration not to exceed
1. Cokeoven by product plant	pH	6.0 to 8.5
	Suspended solids	100
	Phenol	1.0
	Cyanide	0.2
	BOD, 3 days at 27^{0C}	30
	COD	250
	Ammonical Nitrogen	50
	Oil & grease	10
2. Other plants such as sintering plant, blast furnace, steel melting furnace & rolling mill	pH	6.0 to 9.0
	Suspended solids	100
	Oil & grease	10

Emission Standards

Pollutant	Source	Emission limit
Particulate Matter	A. Sintering plant	150 mg/Nm^3
	B. Steel making	
	i) during normal operation	150 mg/Nm^3
	ii) during oxygen lancing	400 mg/Nm^3
	C. Rolling mill	150 mg/Nm^3
Carbon Monoxide	D. Coke-oven	3 kg/tonne of coke produced

Source	Parameter	Emission limit (mg/Nm^3)
(a) Coke oven	Particulate Matter	50
(b) Refractory material plant	Particulate Matter	150

5.5.20. SOFT COKE INDUSTRY

Pollutant	Emission limit
Particulate matter (Corrected to 6% CO_2)	350 mg/Nm^3

Note: Wet scrubbing system alongwith by product recovery system shall be provided.

Guidelines for Emission Control to Improve Work Zone Environment

a. Water used for quenching and wet scrubbing shall be recirculated and reused through catch-pits.

b. Leakages in the oven be sealed by bentonite or by any suitable paste and by proper maintenance to avoid fugitive emission.

Guidelines for Coal Handling and Crushing Plant

a. Unloading of coal trucks should be carried out with proper care avoiding dropping of the materials from height. It is advisable to moist the material by sprinkling water while unloading.

b. Pulverisation of coal shall be carried out in an enclosed place and water sprinkling arrangement shall be provided at coal heaps, crushing area and on land around the crushing unit.

c. Work area surrounding the plant shall be asphalted or concreted.

d. Green belt shall be developed along the boundary of the industry.

e. Open burning of coal to manufacture soft coke shall be stopped

5.5.21. FOUNDRIES

Emission Standards

		Pollutant	Concentration (mg/Nm^3)
(a)	Cupola Capacity (melting rate): Less than 3 tonne/hr 3 tonne/hr and above	 particulate matter -do	 450 150
(b)	Arc Furnaces Capacity: All sizes	 particulate matter	 150
(c)	Induction Furnaces Capacity: All sizes	 -do-	 150

Note :

1. It is essential that stack is constructed over the cupola beyond the charging door and the emissions are directed through the stack which should be atleast six times the diameter of cupola.
2. In respect of arc furnaces and induction furnaces, provision has to be made for collecting the metal fumes before discharging the emissions through the stack

5.5.22. RE-HEATING (REVERBEARATORY) FURNACES

	Parameter	Concentration (mg/Nm^3)
Capacity : All sizes Sensitive area	particulate matter	150
Other area	particulate matter	450

5.5.23. PETROCHEMICALS (BASIC & INTERMEDIATES)

Standards For Liquid Effluent

Parameter		Concentration not to exceed
pH		6.5 - 8.5
BOD (3 days at 27°C)		50
Phenol**		5
Sulphide as S		2
COD		250
Cyanide (as CN).		0.2
Fluoride as F***		15
Total suspended solids		100
Chromium****		
	Hexavalent	0.1
	Total	2.0

* The state boards may prescribed the BOD value of 30 mg/l if the recipient system so demands

** The limit for phenol shall be conformed at the outlet of effluent treatment of phenol plant. However, at the final disposal point, the limit shall be less than 1 mg/l.

*** The limit for fluoride shall be conformed at the outlet of fluoride removal unit. However, at the disposal point fluoride concentration shall be lower than 5 mg/l.

**** The limits for total and hexavalent chromium shall be conformed at the outlet of the chromate removal unit. This implies that in the final treated effluent, total and hexavalent chromium shall be lower than prescribed herein.

5.5.24. PHARMACEUTICALS INDUSTRY (Bulk Drugs)

-	Parameter	Concentration not to exceed
Compulsory parameters	pH	6.5 - 8.5
	Oil & grease	10
	BOD (3 days at 27°C)	100
	Total Suspended solids	100
	Bioassay test	90% survival after 96 hours in 100% effluent. (Test should be carried out as per IS:6582-1971.)
Additional Parameters	Mercury	0.01
	Arsenic	0.2
	Chromium (Hexavalent)	0.1
	Lead	0.1
	Cyanide	0.1
	Phenolics (C_6H_5OH)	1.0
	Sulfides (as S)	2.0
	Phosphate (as P)	5.0

Note:

1. The limit of BOD at 27°C for 3 days will be 30 mg/l if effluent is discharged directly to a fresh water body.
2. The additional parameters are applicable to bulk drug manufacturing units depending upon the process and product.
3. No limit for COD is prescribed, but it should be monitored. If the COD of the treated effluent is greater than 250 mg/l, such industrial units are required to identify chemicals causing the same. In case these are found to be toxic, as defined in the Hazardous Chemicals Rules, 1989 (Schedule I), the state boards in such cases shall direct the industries to install tertiary treatment system within the stipulated time limit. Otherwise COD may not be stipulated. This may be done on a case-to-case basis.

5.5.25. PHARMACEUTICAL MANUFACTURING AND FORMULATION INDUSTRY

Parameter	Concentration
1. pH	5.5-9.0
2. Oil and Grease	10
3. Total Suspended solids	100
4. BOD (3 day at 27°C)	30
5. Bio-assy test	90% Survival of fish after 96 hrs in 100% effluent.
6. Mercury	0.01
7. Aresenic Chromium	0.20
8. Chromium (Hexavalent)	0.10
9. Lead	0.10
10. Cyanide	0.10
11. Phenolics (as C6H5OH)	1.00
12. Sulphides (as S)	2.0
13. Phosphates (as P)	5.00

Note:

1. Parameters listed as 1 to 13 are compulsory for Formulators. However, parameters (6 to 13) will be optional for others.
2. State Board may prescribed limit for chemical oxygen demand (COD) correlated with BOD limit.
3. State Board may prescribe limit for total dissolved solids depending upon uses of recipient water body.
4. Limits should be complied with at the terminal of the treatment unit before letting out of the factory boundary period of 8 hours.

5.5.26. PESTICIDE MANUFACTURING AND FORMULATION INDUSTRY

Parameter	Concentration not to exceed
1. Temperature	Shall not exceed 5°C above the receiving water temperature
2. pH	6.5-8.5
3. Oil & Grease	10
4. BOD (3 days at 27°C)	30
5. Total Suspended Solids	100
6. Bio-assy test	90% Survival of fish after 96 hrs in 100% effluent.
7. **(a) Specific Pesticides:** (concentration in microgram/lit)	
Benzel Hexachloride	10
Carbonyl	10
DDT	10
Endosulfan	10
Diamethoate	450
Fenitrothion	10
Malathion	10
Phorate	10
Methyl Parathion	10
Phenathoate	10
Pyrethrums	10
Copper Oxychloride	9600
Copper Sulphate	50
Ziram	1000
Sulphur	30
Paraquat	2300
Proponil	7300
Nitrogen	780

(b) Heavy Metals

Copper	1.00
Manganese	1.00
Zinc	1.00
Mercury	0.01
Tin	0.10
Any other metal like Nickel etc.	Shall not exceed 5 times the drinking water standards of BIS.

(c) Organics:

Phenol and Phenolic Compounds as C_6H_5OH	1.0

(d) Inorganic:

Arsenics (as As)	0.2
Cyanide (as CN)	0.2
Nitrate (as NO3)	50.0
Phosphate (as P)	5.0

Note:

1. Limits should be complied with at the end of the treatment plant before any dilution.
2. Bio-assay test should be carried out with available species of fish in receiving water.
3. State Boards may prescribe limits of total dissolved solids (TDS) sulphates and chlorides depending on the use of recipient water body.
4. State Board may prescribe COD limit correlated with BOD limit.
5. Pesticides are known to have metabolites and isomers. If they are found in significant concentration, standards may be prescribed for those in the list by Central of State Board.
6. Industries are required to analyze pesticides in wastewater by advanced analytical method such as GLC/HPCL.
7. All the parameters will be compulsory for formulators, for other the 7th will be optimal.

Emission standards :

Parameter	**Concentration not to exceed mg/Nm^3**
HCl	20
Cl_2	5
H_2S	5
P_2O_5 (as H_3PO_4)	10
NH_3	30
Particulate matter with pesticides compounds	20
CH_3Cl	20
HBr	5

5.27. PESTICIDE INDUSTRY

S.No.	Parameter	Concentration not to exceed,
(i)	Compulsory	
	pH	6.5-8.5
	BOD (3 days at 27^0C)	100
	Oil & grease	10
	Suspended solids	100
	Bioassay test	Minimum 90% survival of fish after 96 hrs with 90% effluent and 10% dilution water. Test should be carried out as per IS:6502: 1971
(ii)	Additional (a) Heavy Metal	
	Copper	1.0
	Manganese	1.0
	Zinc	1.0
	Mercury	0.01
	Tin	0.1
	Any other like nickel	shall not exceed 5 times the drinking water standards (BIS) individually
	(b) Organics	
	Phenol & Phenolic compounds (as C_6H_5OH)	1.0
	(c) Inorganics	
	Arsenic as As	0.2
	Cyanide as CN	0.2
	Nitrate as NO3	50
	Phosphate as P	5.0
	(d) Specific pesticide	(microgram/litre)
	Benzene hexachloride	10
	DDT	10
	Dimethoate	450
	Copper oxychloride	9,600
	Ziram	1,000
	2.4D	400
	Paraquat	23,000
	Propanil	7,300
	Nitrofen	780
	Other (below mentioned pesticides individually)	100
	Other Pesticides	
	(i) Insecticides:	
	Aluminium phosphide	Pyrethrum extract
	Dichlorovos	Quinalphos
	Lindane	
	Malathion	

	EDTC Mixer	Methyl bromide	Monocrotophos
	Ethylene dibromide	Nicotine sulphate	Carbaryl
	Ethion	Oxydemeton methyl	Endosulfan
	Fenitrothion	Methyl parathion	Fenvalerate
	Lime-sulphur	Phosphamidon	Phorate
	Temephos		
	(ii) Fungicides:		
	Aureofungin	Organomercurials (MENC & PMA)	
	Barium polysulphide	Sulphur (Colloidal, Wettable & Dust)	
	Cuprous oxide	Streptocycline	
	Ferbam	Thiram	
	Mancozeb	Zineb	
	Manab	Carbendzim	
	Nickel chloride	Tridemorph	
	(iii) Rodenticides:		
	Comafuryl		
	Warfarin		
	Zinc phosphide		
	(iv) Nematicides:		
	Metham N-sodium		
	(v) Weedicides:		
	Fluchloralin		
	Isoproturon		
	Butachlor		
	Anilphos		
	(vi) Plant Growth Regulants:		
	Chloromequat chloride		
	Nemphalene acetic acid		
	(vii) Any other pesticide not specific above.		

Note :

i. Limits should be complied with at the end of the treatment plant before any dilution.

ii. No limit for COD is prescribed. If the COD in a treated effluent is persistently more than 250 mg/l, such industrial units are required to identify the chemicals causing the same. In case these are found to be toxic as defined in Schedule-I of the Hazardous Chemicals Rules, 1989, the State Board in such cases shall direct the industries to install tertiary treatment, stipulating time limit. Otherwise COD may not be stipulated. This may be done on a case-to-case basis.

iii. Solar evaporation followed by incineration is a recognized practice, provided the guidelines of solar evaporation as given below are followed.

Guidelines on solar evaporation system for wastewater from pesticides industry

i. Solar evaporation pans shall be constructed in such a way that the bottom is atleast one meter above the ground level.

ii. Solar evaporation pans shall be leak proof and of impervious construction and designed as per IS:7290.

iii. The solar evaporation pans shall be designed on the basis of evaporation rate matching to the output of wastewater.

iv. Wastewater must be pretreated as below before subjecting to solar evaporations.

   a. Oil & grease and floating organics shall be removed so that the rate of evaporation is not affected

   b. Acidic/alkaline waste must be neutralised before solar evaporation to maintain pH in the range of 6.5 to 8.5.

   c. Toxic volatile matter shall be removed so as not to cause air pollution.

v. During the rainy seasons, storm water shall not be allowed to mix with process waste and enter the pans. The wastewater shall in no case outflow from the evaporation pans. Alternative arrangements shall be made to hold the wastewater in proper impervious tanks and, if necessary, force evaporated.

vi. In no circumstances, the liquid effluent shall be discharged without conforming to the minimal national standards or stored in a holding arrangement which is likely to cause pollution.

vii. The sludge, from the solar evaporation pans shall be incinerated or disposed as per the guidelines for management and handling of hazardous waste, published by the Ministry of Environment & Forests, Government of India, after obtaining authorization from the state pollution control board under the Hazardous Wastes (Handling & Management) Rules of the Environment (Protection) Act, 1986.

viii. The facility should be protected from flood and storm to prevent embankments from erosion or any other damage which may render any portion inoperable.

ix. Facilities should have protective enclosure to keep wildlife, domestic animals, unauthorised persons, etc. away.

5.5.28. INORGANIC CHEMICAL INDUSTRY

Wastewater Discharge Standard (Part I -Metal Compounds of Chromium, Manganese, Nickel, Copper, Zinc, Cadmium, Lead & Mercury)

Parameter	Concentration not to exceed
pH	6.0 - 8.5
Hexavalent Chromium as Cr	0.1
Total Chromium as Cr	2.0
Manganese as Mn	2.0
Nickel as Ni	2.0
Copper as Cu	2.0
Zinc as Zn	5.0
Cadmium as Cd	0.2
Lead as Pb	0.1
Mercury as Hg	0.01
Cyanide as CN	0.2
Oil & grease	10.0
Suspended solids	30.0

In addition to the above, total heavy metals are to be limited to 7 mg/l

5.5.29. ORGANIC CHEMICALS MANUFACTURING INDUSTRY

S.No	-	Parameter	Concentration not to exceed (units in mg/l except pH)
A	Compulsory	pH	6.5-8.5
		BOD (3 days at 27°C)	100
		Oil & grease	10
		Bioassay test	Minimum 90% survival after 96 hours with fish at 100% effluent
B	Additional Parameter	Nitrate (as N)	10
		Arsenic	0.2
		Chromium	
		hexavalent	0.1
		total	1.0
		Lead	0.1
		Cyanide as CN	0.2
		Zinc	5.0
		Mercury	0.01
		Copper	2.0
		Nickel	2.0
		Phenolics as C6H5OH	5.0
		Sulphide	2.0

Note:

i. No limit for COD is prescribed but it should be monitored. If the COD in a treated effulent is persistently greater than 250 mg/l, such industrial units are required to identify chemicals causing the same. In case these are found to be toxic as defined in Hazardous Chemicals Rules, 1989 in Part-I of Schedule-I, the State Boards in such cases shall direct the industries to install tertiary treatment system stipulating time limit. Otherwise, COD may not be stipulated. This may be done on case-to-case basis.

ii. These standards are not applicable to small scale detergent (formulating units).

iii. The standards for boiler emissions will be applicable as per the existing emission regulations.

Industry covered under this group are halo-aliphatics, plasticizers, aromatics (alcohols, phenols, esters, acids and salts, aldehydes and ketone), substituted aromatics, aliphatics (alcohois, esters, acids, aldehydes, ketones, amines and amides) and detergents

5.5.30. SYNTHETIC RUBBER

Standards For Liquid Effluent

Parameter	Concentration not to exceed mg/1
Colour	Absent
pH	5.5 to 9.0
Bio-chemical oxygen demand (27^{oc} for 3 days)	50
Chemical oxygen demand	250
Oil & grease	10

5.5.31. NATURAL RUBBER PROCESSING INDUSTRY

Parameters	Centrifuging and creaming units for disposal		Crape and crumb units for disposal	
	into inland surface water	on land for irrigation	into inland surface water	on land for irrigation
	(concentration in mg/l)		(concentration in mg/l)	
pH	6 - 8	6 - 8	6 - 8	6 - 8
Total Kjeldahl nitrogen (as N)	100	***	50	***
Ammoniacal nitrogen (as N)	50	***	25	***
BOD at 27°C for 3 days	50	100	30	100
COD	250	***	250	***
Oil & grease	10	20	10	20
Sulphide (as S)	2	***	2	***
TDS	2100	NP**	2100	NP**
SS	100	200	100	200
Quantum of waste water generation	5 lit/kg of product processed	8 lit/kg of product processed	40 lit/kg of product processed	40 lit/kg of product processed

** Not prescribed in case effluent is used for rubber plantation of their own. In other cases suitable limit, as necessary may be prescribed by the State Board.

*** Not specified.

5.5.32. NATURAL RUBBER INDUSTRY

Parameters	Mode of Disposal	
	inland surface water	on land for irrigation
.	(concentration in mg/l)	
Colour & odour	Absent	Absent
pH	6 - 9	6 - 8
Total Kjeldahl nitrogen (as N)	100	
Ammoniacal nitrogen (as N)	50	
BOD at 27°C for 3 days	50	100
COD	250	250
Oil & grease	10	10
Sulphide (as S)	2	
Dissolved Solids (inorganic)	2100	2100
Suspended Solids	100	200
Dissolved phosphates(as P)	5	
Free ammonia (as NH_3)	5	

5.5.33. COTTON TEXTILE INDUSTRIES

(Composite and Processing)

Common Parameter	Concentration not to exceed
pH	5.5 to 9
Suspended Solids	100
Bio-chemical oxygen demand (3 days 27°C)	150
Oil and grease	10
Bio-assay test	90% survival of fish of after 96 hours.
Special parameters:	
Total Chromium (as Cr)	2
Sulphide (as S)	2
Phenolic compounds (as C_4H_2OH)	5

Special parameters are to be stipulated by the State Board depending upon the dye used in the industry. Where the industry uses chrome dyes, sulphur dyes and or/phenolic compounds in the dyeing/printing process, the limits on chromium of 2 mg/liter, sulphides or 2 mg/liter and phenolic compounds of 5 mg/liter respectively are stipulated.

Where the quality requirement of the recipient system so warrants, the limit of BOD should be lowered upto 30 mg/liter according to the requirement by the State Board.

A limit on sodium absorption ratio of 26 should be imposed by the State Board, if the disposal of the effluent is to be made on land

5.5.34. TEXTILE INDUSTRY

Parameter	Concentration not to exceed
pH	5.5 to 9.0
Total suspended solids	100
Bio-chemical oxygen demand (BOD) 3 day @ 27°C	30
Chemical oxygen demand (COD)	250
Total residual chlorine	1
Oil and grease	10
Total chromium as Cr	2
Sulphide as S	2
Phenolic compounds as C_6H_5OH	1

Note:

1. Where the treated effluent is discharged into municipal sewer leading to terminal treatment plant, the BOD may be relaxed to 100 mg/l, COD to 400 mg/l.
2. The quantity of effluent (litre per kilogram of product) shall not exceed 100, 250 and 80 in composite cotton textile industry, composite woolen textile industry and textile processing industry, respectively.

5.5.35. GLASS INDUSTRY

Wastewater Discharge Standards

Parameter	Standards
Particulate matter	6.5 to 8.5
Total suspended solids	100 mg/l
Oil & grease	10 mg/l

Emission Standards

A. Sodalime & borosillicate glass and other special glass (other than Lead glass)

Section of the Plant	Parameter	Emission limit
a) Furance Capacity		
Upto a product draw capacity of 60 tpd	Particulate matter	2.0 kg/hr
Product draw capacity more than 60 tpd	Particulate matter	0.8 kg/tonne of product drawn
All capacities	Stack height Sulphur dioxide	minimum stack height (H in mt) $=14Q^{0.3}$ where Q is SO_2 emission rate in kg/hour.
	Total fluorides	5.0 mg/Nm^3
	NOx	use of low NOx burners in new plants

b) Implementation of the following measures for fugitive emission control from other sections

i. Raw materials should be transported in leak proof containers.

ii. Cullet preparation should be dust free using water spraying.

iii. Batch preparation section should be covered.

B. Lead Glass

a) Furance

All capacities	Total particulate matter Lead	50 mg/Nm^3 20 mg/Nm^3

(dust emission from furance feeding "dog house" should be connected to control equipments and meet above standards)

b) Implementation of the following measures for the fugitive emission control from other sections

(i) Batchmixing, proportioning section and transfer points should be covered and it should be connected control equipments to meet following standards:

Particulate matter Lead	50 mg/Nm^3 20 mg/Nm^3

Minimum stack height should be 30 meters in lead glass units.

C. Pot Furnace of Firozabad

Note: Depending upon local environmental conditions, the State/Central Pollution Control Board can prescribe more stringent standards than those prescribed above..

5.5.36. SLAUGHTER HOUSE, MEAT & SEA FOOD INDUSTRY*

Liquid Effluent Standards

Category	Concentration not to exceed, limit in mg/l		
	BOD (3 days at 27°C)	**TSS**	**Oil & grease**
A. Slaughter House			
a) Above 70 TLWK b) 70 TLWK & Below	100** 500	100 -	10 -
B. Meat Processing			
a) Frozen meat	30	50	10
b) Raw meat from own Slaughter house	30	50	10
c) Raw meat from other sources	disposal via screen and septic tank		
C. Sea Food Industry	30	50	10

Note :

i. TLWK -Total live weight killed.

ii. In case of disposal into municipal sewer where sewage is treated, the industries shall install screen and oil & grease separation units.

iii. The industries having slaughter house alongwith meat processing units will be considered in meat processing category as far as standards are concerned.

5.5.37. FOOD & FRUIT PROCESSING INDUSTRY/Wastewater Discharge Standards**

Category	Concentration not to exceed				Quantum
	pH	Suspended Solids (mg/l)	Oil & Grease (mg/l)	BOD at 27°C for 3 days (mg/l)	gm/tonne of product
A.Soft drinks					
a)Fruit based synthetic (more than 0.4 tonne/day) Bottles and tetrapack	6.5-8.5	100	10	30	-
b)Synthetic (<0.4 tonne/day)	disposal via septic tank				
B.Fruits & Vegetables	-	-	-	-	-
a) Above 0.4 tonne/day	6.5-8.5	50	10	30	-
b) 0.1-0.4 tonne/ day	disposal via septic tank				
C. Bakery					
a) Bread and biscuit 1.Continuous process (more than 20 tonne/day)	6.5-8.5	-	-	200	25

2.Noncontinuous Process (less than 20 tonne/day)	disposal via septic tank				
b)Biscuit production	-	-	-	-	-
1) 10 tonne/day & Above	6.5-8.5	-	-	300	35
2) Below 10 tonne/day	disposal via septic tank				
D.Confectionaries	-	-	-	-	-
a) 4 tonne/day & Above	6.5-8.5	50	10	30	-
b) Below 4 tonne/day	disposal via septic tank				

Note:

To ascertain the category of 'unit falls', the average of daily production and wastewater discharge for the preceding 30 operating days from the date of sampling shall be considered

5.5.38. COMMON EFFLUENT TREATMENT PLANT

A. Primary Treatment	Inlet effluent quality for CETP	Concentration
	pH	5.5-9.0
	Temperature ^{0}C	45
	Oil & Grease	20
	Phenolic Compounds (as C_6H_5OH)	5.0
	Ammonical Nitrogen (as N)	50
	Cyanide (as CN)	2.0
	Chromium hexavalnet (as Cr+6)	2.0
	Chromium (total) (as Cr)	2.0
	Copper (as Cu)	3.0
	Lead (as Pb)	1.0
	Nickel (as Ni)	3.0
	Zinc (as Zn)	15
	Arsenic (as As)	0.2
	Mercury (as Hg)	0.01
	Cadmium (as Cd)	1.0
	Selenium (as Se)	0.05
	Fluoride (as F)	15
	Boron (as B)	2.0
	Radioactive Materials Alpha emitters, Hc/mL	10^{-7}
	Beta emitters, Hc/ml	10^{-6}

Note:

1. These standards apply to the small-scale industries, i.e., total discharge upto 25 KL/Day.

2. For each CETP and its constituent units, the State Board will prescribe standards as per the local needs and conditions; these can be more stringent than those prescribed above. However, in case of clusters of units, the State Board with the concurrence of CPCB in writing, may prescribe suitable limits.

B. Treated Effluent Quality of Common Effluent Treatment Plant Concentration in mg/l except pH & Temperature.

Parameter water	**Into inland surface**	**On land for irrigation areas**	**Into marine coastal**
pH	5.5-9.0	5.5-9.0	5.5-9.0
BOD 3 day @ 27°C	30	100	100
Oil & grease	10	10	20
Temperature	Shall not exceed 40°C in any section of the Stream within15 meters downstream from the effluent outlet	-	45°C at the point of discharge
Suspended Solids	100	200	(a) For process Wastewater-100 (b) For cooling water effluents 10 % above total suspended matter of influent cooling water
Dissolved Solids (Inorganic)	2100	2100	-
Total residual Chlorine	1.0	-	1.0
Ammonical nitrogen (as N)	50	-	50
Total Kjeldahl nitrogen (as N)	100	-	100
Chemical Oxygen Demand	250	-	250
Arsenic (as As)	0.2	0.2	0.2
Mercury (as Hg)	0.01	-	0.01
Lead (as Pb)	0.1	-	1.0
Cadmium (as cd)	1.0	-	2.0
Total Chromium (as Cr)	2.0	-	2.0
Copper (as Cu)	3.0	-	3.0
Zinc (as Zn)	5.0	-	15
Selenium (as Se)	0.05	-	0.05
Nickel (as Ni)	3.0	-	5.0
Boron (as B)	2.0	2.0	-

Percent Sodium	-	60	-
Cyanide (as CN)	0.2	0.2	0.2
Chloride (as Cl)	1000	600	-
Fluoride (as F)	2.0	-	15
Sulphate (as SO4)	1000	1000	-
Sulphide (as S)	2.8	-	5.0
Pesticides	Absent	Absent	Absent
Phenolic Compounds As (C_6H_5OH)	1.0	-	5.0

Note: All efforts should be made to remove colour and unpleasant odour as far as possible

5.5.39. DAIRY INDUSTRY

Effluent Standards:

Parameter	Concentration not to exceed	Quantum per product processed
pH	6.5-8.5	-
*BOD at 27°C 3 days	100	-
**Suspended solids	150	-
Oil and grease	10	-
Wastewater generation	-	3 m^3/Kl of milk

Note:

* BOD may be made stringent upto 30mg/l if the recipient fresh water body is a source for drinking water supply. BOD shall be upto 350mg/l for the chilling plant effluent for applying on land provided the land is designed and operated as a secondary treatment system with suitable monitoring facilities. The drainage water from the land after secondary treatment has to satisfy a limit of 30mg/l of BOD and 10mg/l of nitrate expressed as 'N'. The net addition of the groundwater quality should not be more than 3mg/l of BOD and 3 mg/l of nitrate expressed as 'N'. The limit for applying on land is allowed subject to the availability of adequate land for discharge under the control of the industry, BOD value is relaxable upto 350mg/l, provided the wastewater is discharged into a town sewer leading to secondary treatment of the sewage.

** Suspended solids is relaxable upto 450 mg/l, provided the wastewater is discharged into town sewer leading to secondary treatment of the sewage.

5.5.40. EDIBLE OIL & VANASPATI INDUSTRY

Parameter	Concentration not to exceed
Temperature	Not more than 5°c above ambient temperature of the recipient water body.
pH	6.5-8.5
Suspended solids	150 mg/l
Oil & grease	20 mg/l
BOD at 27°C, 3 days	100 mg/l

COD	200 mg/l
Wastewater discharge	
(i) Solvent extraction	2.0 m^3/tonne of product oil
(ii) Refinery/vanaspati (refined oil/vanasapti)	2.0 m^3/tonne of product
(iii) Integrated unit of solvent extraction & refinery/vanaspati	4.0 m^3/tonne of refinedoil/Vanaspati produced
(iv) Barometric cooling water/deodoriser water	15.0 m^3/tonne of refined oil/vanasapti

Note :

1. The above standards will be applicable to wastewater from processes and cooling.
2. BOD shall be made stringent upto 30 mg/l if the recipient fresh water body is a source of drinking water supply.

5.5.41. FLOUR MILLS Note

Parameter	Concentration not to exceed
pH	6.5-8.5
BOD at 27°C for 3 days	100 mg/l

Note :

1. BOD shall be made stringent upto 30 mg/l if the recipient fresh water body is a source of drinking water supply.
2. BOD shall be allowed upto 350 mg/l for applying on land, provided the land is designed and operated as a secondary treatment system with the requisite monitoring facilities. The drainage water from the land after secondary treatment has to satisfy the limit of 30 mg/l of BOD and 10 mg/l of nitrate expressed as 'N'. The net addition to the groundwater quality should not more than 3 mg/l of BOD and 10 mg/l of nitrate expressed 'N'.
3. BOD shall be allowed upto 350 mg/l for discharge into a town sewer, if such sewer leads to a secondary biological treatment system
4. Suspended solids limit shall be allowed upto 450 mg/l for discharge into a town sewer if, such sewer leads to a treatment system.

5.5.42. STARCH INDUSTRY (MAIZE PRODUCTS)

Parameters	Concentration not to exceed,
pH	6.5 - 8.5
BOD at 27^0C for 3 days*	100
Suspended solids*	150
Wastewater discharge	8 m^3/tonne of maize processed

***Note:** The prescribed limits for BOD and suspended solids shall be made more stringent or less stringent depending upon the local requirements as mentioned below.

1. BOD shall be made stringent upto 30 mg/l if the recipient fresh water body is a source for drinking water supply.

2. BOD shall be allowed upto 350 mg/l for applying on land, provided the land is designed and operated as a secondary treatment system with the requisite monitoring facilities. The drainage water from the land after secondary treatment has to satisfy a limit of 30 mg/l of BOD and 10 mg/l of nitrate expressed s 'N'. The net addition to ground waste quality should not be more than 3 mg/l of BOD and 10 mg/l of nitrate expressed as 'N'.
3. BOD shall be allowed 350 mg/l for discharge into a town sewer, if such sewer leads to a biological secondary treatment system.
4. Suspended solids shall be allowed upto 450 mg/l for discharge into town sewer, if such sewer leads to a biological secondary treatment system.
5. In the event of bulking of sludge, the industry shall immediately apprise the respective State Pollution Control Board.

5.5.43. STONE CRUSHING UNIT

Standards For Suspended Particulate Matter

The standards consist of two parts:

i) Implementation of the following pollution control measures:

a. Dust containment cum suppression system for the equipment.

b. Construction of wind breaking walls.

c. Construction of the metalled roads within the premises.

d. Regular cleaning and wetting of the ground within the premises.

e. Growing of green belt along the periphery.

ii) Quantitative standard for the SPM

a. The suspended particulate matter measured between 3 to 10 metres from any process equipment of a stone crushing unit shall not exceed 600 $\mu g/m^3$.

b. The suspended particulate matter contribution value at a distance of 40 meters from a controlled isolated as well as from a unit located in a cluster should be less than 600 mg/Nm^3. The measurements are to be conducted atleast twice a month for all the 12 months in a year.

5.5.44. ALUMINIUM PLANTS

Emission Standards	Pollutants	Emission Limit
(a) Alumina Plant (Primary and SecondaryCrusher)		
	Particulate Matter	150 mg/Nm^3
ii) Precipitation Areas - calcination	Particulate Matter Carbon Monoxide Stack Height	250 mg/Nm^3 1% max. $H=14\ (Q)^{0.3}$ where, Q is emission rate of SO_2 in kg/hr and H is stack height in metres

(b) Smelter Plant

i) Green Anode Shop	Particulate Matter	150 mg/Nm^3
ii) Anode Bake Oven	-do-	50 mg/Nm^3
iii) Pot room		
	Total Flouride	
	For Sonderberg* technology	2.8 kg/ton by 31st DEC. 2006
	For Prebaked technology	0.8 kg/ton by 31st DEC. 2006
	Stack Height	$H=14(Q)^{0.3}$ where Q is emission rate of SO_2 in kg/hr and H is stack height in metres.

(C) Standards for forage fluoride

	Concentration
Twelve consecutive months average	40 ppm
Two consecutive months average	60 ppm
One month average	80 ppm

5.5.45. CALCIUM CARBIDE PLANT

Source/Process	Pollutants	Emission Limit (mg/Nm^3)
Kiln	Particulate Matter	250
Arc Furnace	-do-	150

5.5.46 CARBON BLACK INDUSTRY

Parameter	Emissions limit
Particulate Matter	150 mg/Nm^3

5.5.47. ASBESTOS MANUFACTURING INDUSTRY:

Emission Standards

	Pollutants	Emission limit
All types of asbestos manufacturing Units (including all processes involving the use of asbestos)	Pure asbestos material	0.5 Fibre*/cc upto 2.2.07
		0.2 Fibre*/cc after 3.2.07
	Total dust	2 mg/Nm^3

* Fibre of length more than 5 micrometre and diametre less than 3 micrometre with an aspect ratio of 3 or more.

5.5.48. LIME KILNS

Emission Standards

Capacity of the lime kiln	Pollutant	Emission limit
Upto 5 tpd	Particulate Matter	A hood should be provided with a stack of 30 metre height from ground level (including kiln height)
More than 5 tpd and Upto 40 tpd	Particulate Matter	500 mg/Nm^3
Above 40 tpd	Particulate Matter	150 mg/Nm^3

5.5.49. BRICK KILNS

Emission Standards

Size	Kiln Capacity	Maximum limit of concentration for particulate matter. (mg/Nm^3)
Small	Less than 15,000 bricks per day (less than 15 ft trench width)	1000
Medium	15,000-30,000 bricks per day (15-22 ft trench width)	750
Large	More than 30,000 bricks per day (more than 22 ft trench width)	750

Stack Height Regulation:

The following stack heights are recommended for optimal dispersion of sulphur dioxide.

Kiln Capacity	Stack Height
Less than 15,000 bricks are day (less than 15 ft trench width)	Minimum stack height of 22 m, or, induced draught fan operating with minimum draught of 50 mm Water Gauge with 12 m stack height.
15,000-30,000 bricks per day (15-22 ft trench width)	Minimum stack height of 27 m with gravitational settling chamber or Induced draught fan operating with minimum draught of 50 mm Water Gauge with 15 m stack height.
More than 30,000 bricks per day (more than 22 ft trench width)	Minimum stack height of 30 m with gravitational settling chamber or Induced draught fan operating with minimum draught of 50 mm Water Gauge with 17 m stack height.

Existing moving chimney Bull's trench kilns shall be dispensed with by December 31, 1987 and no new moving chimney kilns shall be allowed to come up.

Considering the immediate need to protect the top soil and to find ways the safe disposal/utilisation of fly ash, it is provided that from the 1st Jaunary 1997, all brick manufacturing units within a radius of 50 kms from any thermal power plant, shall utilise fly ash in optimal proportion for making bricks.

Amendments :

(i) Existing Moving bull's trench kilns shall be dispensed by June 30, 1999 and no new moving chimney kilns shall be allowed to come up.

(ii) Existing moving chimney bull's trench kilns shall be dispensed with by June 30, 2000 and no new moving chimney kilns shall be allowed to come up.

5.5.50. BAGASSE-FIRED BOILERS

Emission Standards

Type of boilers	Pollutants	Concentration in mg/Nm^3
Step grate	Particulate Matter	250
Horse shoe/pulsating grate	Particulate Matter	500(12% CO_2)
Spreader stroker	Particulate Matter	800(12% CO_2)

Note:

In the case of horse shoe and spreader stroker boilers, if more than one boiler is attached to a single stack, the standard shall be fixed based on added capacity of all the boilers connected with the stack

5.5.51. BOILER(SMALL)

Steam generation capacity (ton/hour)	Particulate matter
Less than 2	1200*
2 to less than 10	800*
10 to less than 15	600*
15 and above	150**

* To meet the respective standards, cyclone/multicyclone is recommended as control equipment with the boiler.

** To meet the standard, bag filter/ESP is recommended as control equipment with the boiler.

Note:

I. 12% of CO2 correction shall be the reference value for particulate matter emission standards for all categories of boilers.

II.These limits shall supercede the earlier limits notified under Schedule I at Sr. No. (34) of EPA, 1986 (GSR 742E,dated 30 August, 1990)

III. **Stack Height for Small Boilers**

For the small boilers using coal or liquid fuels, the required stack height with the boiler shall be calculated by using the formula

$H = 14\ Q^{0.3}$

Where H = Total stack height in metres from ground level

Q = Sulphur dioxide (SO_2) emission rate in kg/hr

In no case, the stack height shall be less than 11 metres. Where providing tall stacks are not feasible using above formula, the limit of 400 mg/Nm^3 for SO_2 emission shall be met by providing necessary control equipment with a minimum stack height of 11 metres.

Guidelines for Pollution Prevention in Small Boilers

Following GUIDELINES for Pollution Prevention in <2TPH small boilers are suggested. Guidelines are made for both boiler manufacture & boiler users separately.

Guidelines for Boiler Manufacturer

(I) The boiler should be provided with an ID fan of appropriate capacity.

(II) A provision for sucking in secondary air above the fuel bed with adjustable opening area should be provided.

(III) A butterfly type damper with appropriate arrangement for fixing damper at various positions easily, should be provided at the inlet side of the fan.

(IV) THe ID fan & damper should be located preferably nearer to the front side of boiler & should be easily eccessible such that the boiler operator can access the damper easily & quickly & can operate while looking at boiler furnace condition.

(V) A single cyclone of appropriate size be provided in the circuit alongwith "bottom storage hopper fitted with an air tight Rotary air lack valve with a handle".

(VI) An economiser should be provided in the circuit for pre-heating boiler feed water.

(VII) Proper "tube cleaning" arrangement & required tools should be provided along with its operating instructions.

(VIII) Proper instructions to be provided for obtaining and maintaining desired quality of boiler feed water & chemicals to be added to reduce/remove deposits on "water side of tubes".

(IX) Proper information & instructions should be provided regarding, "which different fuels can be fired" in the boiler (Solid & liquid) and how it should be fired, how much at a time and desired frequency of its firing etc. (All the above mentioned information/instruction etc. could be compiled as part of the "Boiler Operating Manual" & supplied by boiler Manufacturer alongwith the boiler).

(X) The flue gas carrying duct should be sized appropriately, say for peak flowrate gas velocity of 14 to 16 m/s to be maintained.

(XI) A portable and simple to operate type (say, Pyrite kit) CO2 monitroing instrument should be provided.

Guidelines for Boiler Users

(i) Solidfuels like coal briquettes etc. should be appropriately sized approx. 1 to 2 inch size /dia (large pieces to be broken, wherever required).

(ii) Fuelshould be fired uniformly and in less quantity at a time such that the bed thickness does not exceed aboyt 6 to 9 inches (and not in big heaps). Depending on high/low steam demand, the frequency of firing could be increased or decreased (say 4 to 5 times / hour during higher steam demand, or say 2 to 3 times /hr during lower steam demand).

(iii) Every time the fuel is fired, the damper should be set to "High" position for a minute or two (this would suck more combustion aire required for burning volatile matter & thereby reduce soot / black smoke formation), and then it should be set back to "Low" position, till the next firing. (Setting could be made after a few trails). This damper adjustment should be done by the boiler operator throughout the boiler operation as a part of his regular duty like firing fuel for achieving optimised combstion at all time & thereby preventing pollution.

(iv) "Secondary air opening " to be kept full open at the time of firing for one or two minutes. Later, the opening "Must" be reduced till next firing. (Setting by tiral & error).

(v) Fire bed should be cleaned at appropriate time to avoid build-up of "fire bed thickness", if not, this would reduce the primary air supply successively & result into improper combustion.

(vi) Soot deposits in tubes should be cleaned from time to time with proper tool. Build up of deposits effects the steam generation adversly and result into higher fuel gas temp. & higher stack loss.

(vii) The economiser should be kept properly insulated.

(viii) The cyclone bottom opening should be kept air tight & leak proof, else, it would reduce cyclone efficiency. The duct collected should be taken out from time to time (say once per shift) & appropriately disposed avoiding secondary pollution.

(ix) Good quality feed water should be used for boiler & appropriate chemicals should be added, as directed by boiler supplie, for avoiding tube deposits, else it would reduce steam generation.

(x) CO_2 % should be checked frequently (say once a day initially) to ensure proper boiler operation & take corrective actions, if required, immediately

5.5.52. BOILERS USING AGRICULTURE WASTE AS FUEL

Type of boiler/parameter	Emission limits
Step Grate particulate matter	250 mg/Nm^3
Horse Shoe/Pulsating Particulate matter	500 mg/Nm^3 (12% of CO_2)
Spreader stroker Particulate matter	500 mg/Nm^3 (12% of CO_2)

5.5.53 CERAMIC INDUSTRY

Emission Standards

	Sections	Pollutants	Concentration in mg/Nm^3
A.	**Kilns**		
	(a) Tunnel, Top Hat, Chamber	Particulate Matter Fluoride Chloride Sulphur dioxide	150 10 100 **
	(b) Down-draft	Particulate Matter Fluoride Chloride Sulphur dioxide	1200 10 1000 **
	(c) Shuttle	Particulate Matter Fluoride Chloride Sulphur dioxide	150 10 100 **
	(d) Vertical Shaft Kiln	Particulate Matter Fluoride Sulphur dioxide	250 10 **
	(e) Tank Furnace	Particulate Matter Fluoride Sulphur dioxide	150 10 **

B.	**Raw Material handling, Processing and operations**		
	(a) Dry raw materials handling and processing operations	Particulate Matter	150
	(b) Basic raw material and processing operations	Particulate Matter	*
	(c) Other sources of air pollution generation	Particulate Matter	*
C.	**Automatic Spray Unit**		
	(a) Dryers		
	(i) Fuel fired dryers	Particulate Matter	150
	(ii) For heat recovery dryers	Particulate Matter	*
	(b) Mechanical finishing operation	Particulate Matter	*
	(c) Lime/Plaster of Paris manufacture		
	Capacity:	**Stack Height**	
	Upto 5 tpd	-do-	Hood should be provided with a stack of 30 metre height from ground level (including Kiln height)
	Above 5 tpd	-do-	$H=14(Q)^{0.3}$ Where Q is emission rate of SO_2 in kg/hr and H = Stack Height in metres
	more than 5 tpd and up to 40 tpd	Particulate Matter	500 mg/Nm^3
	More than 40 tpd	-do	150 mg/Nm^3

Note :

Oxygen reference level for particulate matter concentration calculations for Kilns mentioned at A(c) is 18% and for those at A(b), A(d), and A(e) is 8%.

* All possible preventive measures should be taken to control pollution as far as practicable.

** The standard for sulphur dioxide in terms of stack height limits for kilns with various capacities of coal consumption shall be as indicated below.

Coal Consumption per day	Stack Height (metre)
Less than 8.5 MT	9
More than 8.5 to 21 MT	12
More than 21 to 42 MT	15
More than 42 to 64 MT	18
More than 64 to 104 MT	21
More than 104 to 105 MT	24
More than 105 to 126 MT	27
More than 126 MT	30 or using formula $H = 14(Q)^{0.3}$ which ever is more

Note :

H = Physical stack height
Q = Sulphurdioxide emission, kg/hr

5.5.54. BATTERY MANUFACTURING INDUSTRY

Lead Acid Manufacturing Industry :

Emission Standards

Source	Pollutants	Standards	
		Conc. Based, (mg/Nm^3)	Load based, (kg/tonne of Pb used)
Grid casting	Lead	10	0.020
	Particulate Matter	25	
Oxide Manufacturing	Lead	10	0.010
	Particulate Matter	25	
Paste mixing	Lead	10	0.025
	Particulate Matter	25	
Assembling	Lead	10	0.010
	Particulate Matter	25	
PVC section	Particulate Matter	150	--

- To comply the respective standards, all the emissions from above mentioned sources shall be routed through stack connected with hood and fan. In addition to above installation of control equipment viz. Bag filter/ventury scrubber is also recommended.
- The minimum stack height shall be 30 m.

Liquid Effluent Discharge Standards

Pollutant	Concentration
pH	6.5 - 8.5
Suspended solids	50 mg/l
Lead	0.1 mg/l

Dry Cell Manufacturing Industry: Emission Standards

	Standards	
Pollutant	Concentration based (mg/Nm^3)	Load based (kg/lakh cell)
Particulate Matter	50	1.5
Manganese as Mn	5	0.3

- To comply with the respective standards, all the emissions from above mentioned sources shall be routed through stack connected with hood and fan. In addition to above installation of control equipment viz. Bag filter/ventury scrubber is also recommended.
- The minimum stack height shall be 30 m.

Effluent Standards

Pollutant	Concentration
pH	6.5 - 8.5
Total suspended solids	100 mg/l
Manganese as Mn	2 mg/l
Mercury as Hg	0.02 mg/l
Zine as Zn	5 mg/l

Secondary Lead Smelters

Pollutant	Concentration
Lead as Pb	10 mg Nm^3
Particulate Matter	50 mg Nm^3
Minimum stack height	30 m

5.5.55. NOISE STANDARDS FOR THE SOURCE

STANDARDS/GUIDELINES FOR CONTROL FOR NOISE POLLUTION FROM STATIONARY DIESEL GENERATOR (DG) SETS.

Noise Standards for DG Sets (15-500 KVA)

The total sound power level, LW, of a DG set should be less than 94 + 10 log10 (KVA), dB(A), at the manufacturing stage, where KVA is the nominal power rating of a D.G. set.

Mandatory acoustic enclosure/acoustic treatment of room for stationary DG Sets (5 KVA and above)

Noise form the D.G. Set should be controlled by providing an acoustic enclosure on by treating the room acoustically.

The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB(A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is n the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances, the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/room, and them averaged.

The DG Set should also be provided with proper exhaust muffler with Insertion Loss of minimum 25 dB(A).

Guidelines for the manufacturers/users of DG Sets (5 KVA and above)

1. The manufacturer should offer to the user a standard acoustic enclosure of 25 dB(A) Insertion Loss and also a suitable exhaust muffler with Insertion Loss of 25 dB(A).
2. The user should make efforts to bring down the noise levels due to the DG Set, outside his premises, within the ambient noise requirements by proper siting and control measures.
3. The manufacturer should furnish noise power levels of the unsilenced DG Sets as per standards prescribed under (A).
4. The total sound power level of a DG Set, at the user's end, shall be within 2 dB(A) of the total sound power level of the DG Set, at the manufacturing stage, as prescribed under (A).

5. Installation of a D.G. Set must be strictly in compliance with the recommendations of the DG Set manufacturer.

6. A proper routine and preventive maintenance procedure for the DG Set should be set and followed in consultation with the DG Set manufacturer, which would help prevent noise levels of the DG Set from deteriorating with use.

5.5.56. NOISE STANDARDS FOR FIRE CRACKERS

(a) (i) The manufacture, sale or use of fire-crackers generating noise level exceeding 125 dB(AI) or 145 dB(C)pk at 4 meters distance from the point of bursting shall be prohibited.

(ii) For individual fire-cracker constituting the series (joined fire-crackers), the above mentioned limit be reduced by 5 log10 (N) dB, where N - number of crackers joined together.

(b) The broad requirements for measurement of noise from fire-crackers shall be -

(i) The measurements shall be made on a hard concrete surface of minimum 5 meter diameter or equivalent.

(ii) The measurements shall be in free held conditions. i.e., there shall not be any reflecting surface upto 15 meter distance from the point of bursting.

(iii) The measurement shall be made with an approved sound level meter.

(c) The Department of Explosives shall ensure implementation of these standards

Note:

dB(AI): A-weight impulse Sound Pressure Level in decibel.

dB(C)pk: C-weight Peak Sound Pressure Level in decibel.

5.5.57. GUIDELINES FOR POLLUTION CONTROL IN GINNING MILLS.-

Measures for Noise Control

i. Creating separate soundproof enclosures for the fans within the ginning area.

ii. Keeping the fans outside the qinning rooms in separate enclosures.

iii. Roller gins may be covered by sound proof enclosures and use of pneumatic feeding of raw cotton while suction of ginned cotton is introduced to considerably reduce the dust pollution level.

Measures for Dust Control

i. The fugitive emission can be largely controlled by employing mechanical or pneumatic handling of raw material and ginned material through covered ducts and providing overhead hoods connected to exhaust through ducts and filters; use of lifting platforms for bale formers.

ii. The overhead hoods with exhaust arrangement can be provided at:

a. The saw-ginning machine where manual handling to maintain proper feeding in the machine.

b. At the feeding point of the roller ginning machine when manual feeding is carried out.

c. At the collection points of ginned cotton from saw ginning condenser".

5.5.58. NOISE LIMIT FOR GENERATOR SETS RUN WITH PETROL OR KEROSENE

These rules are applicable to all new generator sets using petrol or kerosene as fuel, manufactured in or imported into India.

Provided that these rules shall not apply to:

a. Any genset manufactured or imported for the purpose of exports outside India, or

b. The genset is intended for the purpose of sample only and not for sale in India.

	Noise limit from	
	September 1, 2002	September 1, 2003
Sound Power Level Lwa	90 dB(A)	86 dB(A)

Note: for complete rules please see official Gazette notification.

5.5.59. EMISSION LIMITS FOR NEW DIESEL ENGINES (UP TO 800 KW) FOR GENERATOR SETS (GENSETS) APPLICATIONS

Emission Limits

The emission limits for new diesel engines up to 800 kW, for gensets applications shall be as given in the following Table

These rules shall apply to all new diesel engines for genset applications (hereinafter referred to as 'engine') manufactured in India and all diesel engines for genset applications and diesel gensets, imported into India, after the effective date:

Provided that these rules shall not apply to :

a. any engine manufactured or engine or product imported for the purpose of export outside India, or;

b. any engine or product intended for the purpose of sample only and not for sale in India.

Capacity of diesel engines	**Date of implementation**	**Emission Limits (g/kw-hr) for**				**Smoke Limit (light absorption coefficient, m-1) at full load)**	**Test cycle**	
1	2	3				4	5	
		NOx	HC	CO	PM		Torque %	Weighting factors
Upto 19 kw	1-7-2005	9.2	1.3	3.5	0.3	0.7	100/75	0.05/0.25
> 19 kw upto 176 kw	1-1-2004	9.2	1.3	5.0	0.5	0.7	50	0.30
	1-7-2004	9.2	1.3	3.5	0.3	0.7	25	0.30
> 176 kw upto 800 kw	1-11-2004	9.2	1.3	3.5	0.3	0.7	10	0.10

Note:

For detailed information official gazette/MoEF or CPCB website may be referred

5.5.60. WATER QUALITY STANDARDS FOR COASTAL WATERS MARINE OUTFALLS

In a coastal segment marine water is subjected to several types of uses. Depending of the types of uses and activities, water quality criteria have been specified to determine its suitability for a particular purpose. Among the various types of uses there is one use that demands highest level of water quality/ purity and that is termed a "designed best use" in that stretch of the coastal segment. Based on this, primary water quality criteria have been specified for following five designated best uses:

Class	Designated best use
SW-I	Salt pans, Shell fishing, Mariculture and Ecologically Sensitive Zone.
SW-II	Bathing, Contact Water Sports and Commercial fishing.
SW-III	Industrial cooling, Recreation (non contact) and Aesthetics.
SW-IV	Harbour.
SW-V	Navigation and Controlled Waste Disposal.

The standards along with rationale/remarks for various parameters, for different designated best uses, can be seen in the official Gazette notification or in the MoEF/CPCB website.

5.5.61. EMISSION STANDARDS FOR DIESEL ENGINES (ENGINE RATING MORE THAN 0.8 MW (800 KW) FOR POWER PLANT. GENERATOR SET APPLICATIONS AND OTHER REQUIREMENTS

Parameter		Area Category	Total engine rating of the plant (includes existing as well as new generator sets)	Generator sets commissioning date		
				Before 1.7.2003	Between 1.7.2003 and 1.7.2005	On or after 1.7.2005
NOx 9as NO_2) (At 15% O_2 dry basis, in ppmv		A	Up to 75 MW	1100	970	710
		B	Up to 150 MW			
		A	More than 75 MW	1100	710	360
		B	More than 150 MW			
NMHC (as C) (at 15% (O_2), mg/Nm^3		Both A and B		150	100	
PM (at 15% O_2)$_3$, mg/Nm^3	Diesel Fuels- HSD & LDO	Both A and B		75	75	
	Furnace Oils - LSHS & FO	Both A and B		150	100	
CO (at 15% O_2), Mg/Nm^3		Both A and B		150	150	
Sulphur content in fuel		A			<2%	
		B			<4%	
Fuel specification		For A only	Upto 5 MW	Only Diesel Fuels (HSD, LDO) Shall be used.		
Stack height (for generator sets commissioned after (1.7.2003)		Stack height shall be maximum of the following, in meter : (i) $14Q^{0.3}$, Q+Total SO_2 emission from the plant in kg/hr. (ii) Minimum 6m. above the building where generator set is installed. (iii) 30m.				

6. CONSENT, AUTHORISATION & REGISTRATION MANAGEMENT PRACTICES

CONSENT, AUTHORISATION & REGISTRATION MANAGEMENT PRACTICES

KSPCB has wide range of responsibilities derived from various enactments of law touching on almost every aspect of the environment. The Board aim to deliver integrated environmental management to its stakeholders and accordingly the Board's work covers the following areas:

- Enforcing laws to control pollution;
- Collection of cess from stakeholders as per the provisions of law;
- Defining and monitoring standards;
- Responding to pollution incidents;
- Awareness creation; and
- Advisor to stakeholders.

The following table gives a list of legislations to protect the environment through control of pollution:.

	Legislation	**Implementing Institutions**
1	The Environment (Protection) Act **1986**	MoEF, CPCB, KSPCB, GPD
1a	Hazardous waste (Management and Handling) Rules **1989**	KSPCB, CPCB, DoE, MoEF
1b	The Manufacture, Storage and Import of Hazardous Chemical Rules **1989** DDRO, MoD	MoEF, CCIE, CPCB, IoF, CioDS, CioM, AERB, CCE, DC, DEA, DES, DRDO,
1c	The Manufacture, Use, Import, Export and Storage of hazardous Micro-organisms/ Genetically Engineered Organisms or Cells Rules **1989**	RDAC, RCGM, IBSC, GEAC, SBCC, DLC
1d	The Chemical Accidents (Emergency Planning, Preparedness, and Response) Rule **1996**	CCG, SCG, DCG, LCG
1e	Biomedical Waste (Management and Handling) Rules **1998**	KSPCB
1f	The Municipal Solid wastes (Management & Handling) Rules **2000**	KSPCB, CPCB, DC, Local body
1g	Recycled Plastic Manufacture and Usage Rules **1999**	KSPCB, CPCB, DC
1h	Ozone Depleting Substances (Regulation and Control) Rules **2000**	AODSR
1i	The Noise Pollution (Regulation and Control) Rules **2000**	KSPCB, Police Department
1j	Batteries (management and Handling) Rules **2001**	KSPCB, CPCB, MoEF

1k	The Public Liability Insurance Act **1991**	DC
1l	National Environnemental Tribunal Act **1995**	NET
1m	The National Environment Appellate Authority Act **1997**	NEAA
1n	The Water (Prevention and Control of Pollution) Act **1974**	KSPCB, CPCB
1o	The Water (Prevention and Control of Pollution) Cess Act **1977**	KSPCB, CPCB
1p	Factories Act **1948**	IoF
1q	Air (Prevention and Control of Pollution) Act **1981**	KSPCB, CPCB
1r	Indian Penal Code **1962**	Police Department
1s	Atomic Energy Act **1962**	AERB

Key Words

AERB: Atomic Energy Regulatory Board AODSR: Authority specified under Ozone Depleting Substances (Regulation and Control Rules 2000) CCE: Chief Controller of Explosives, CCIE: Chief Controller of Imports and Exports, cloDS: Chief Inspector of Dock Safety, cloM: Chief Inspector of Mines, CPCB: Central Pollution Control Board, DoE: Department dealing with subject of Environment in State, DC: Deputy Commissioner of a District, DEA: District Emergency Authority, DES: Director of Explosives (Safety), DRDO: Defense Research and Development Organization, DDRD: Department of Defense, Research and Development, DLC: District Level Committee, GPD: Ganga Project Directorate, IoF: Inspectorate of Factories, KSPCB: Karnataka State Pollution Control Board, MoEF: Ministry of Environment and Forest, MoD: Ministry of Defence, NEAA: National Environment Appellate Authority, NET: National Environmental Tribunal, QAATS: Officers/Agencies Authorised To Take Sample under EPA India, PA: Prescribed Authority, SBCC: State Biotechnology Co-ordination Committee

6.1 CONSENTS AND AUTHORIZATIONS

The Board issues various consents and authorizations to allow people to:

- Discharge effluents;
- Discharge emissions;
- Dispose hazardous waste;
- Dispose biomedical waste; and
- Dispose municipal waste.

Further details of the procedure and applications for Consents/Authorisation are available in the Board's website http://kspcb.kar.nic.in. All consent/authorisation forms can be downloaded from the website of the Board.

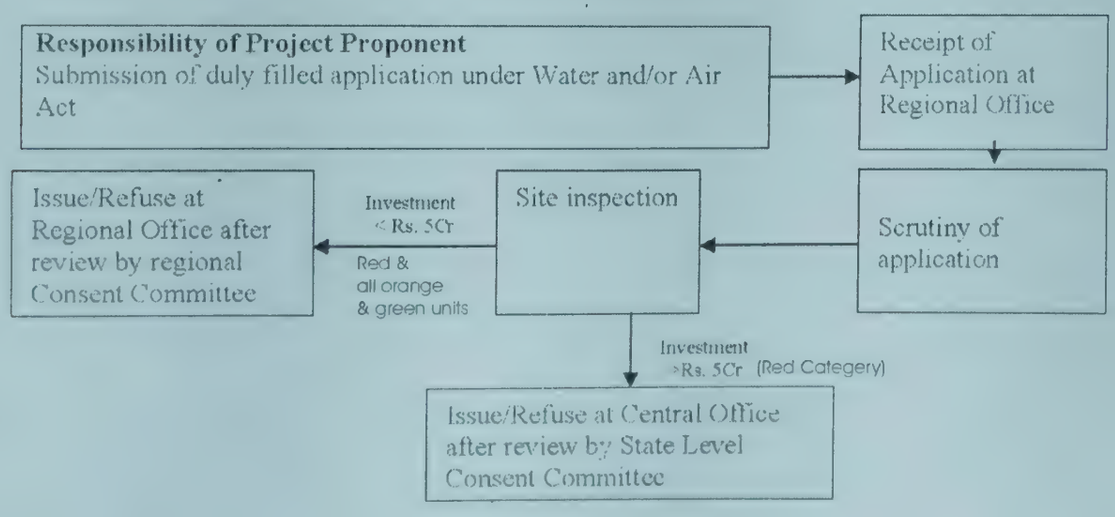
There are 2 types of consents. Consent for establishment (CFE) has to be obtained prior to establishment of an industry, operation or a process. Consent for operation (CFO) has to be obtained prior to commissioning of an industry and for continuation of discharge of emission and effluents

6.1.1 Consent for Establishment (CFE).

All stationary activities which are likely to generate wastewater and air pollutants are required to obtain CFE under the Water and Air Act prior to taking up establishment of any new activity covered under the statutes.

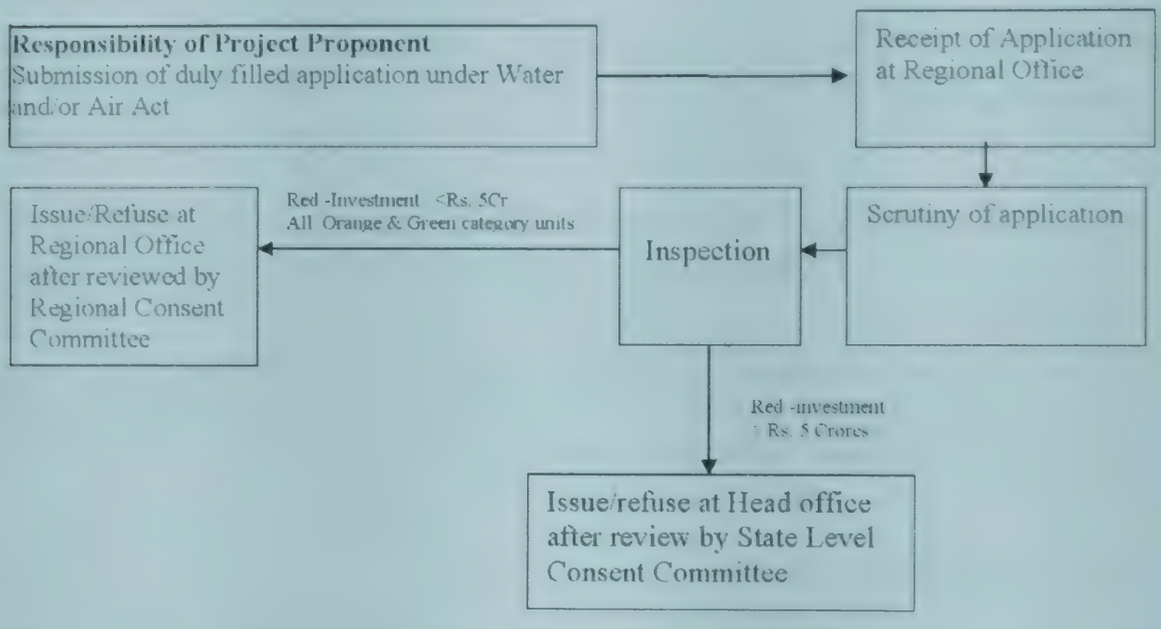
The procedure of obtaining CFE which attracts Environmental Impact Assessment (EIA) notification of Government of India is shown below:

Projects that do not attract EIA notification



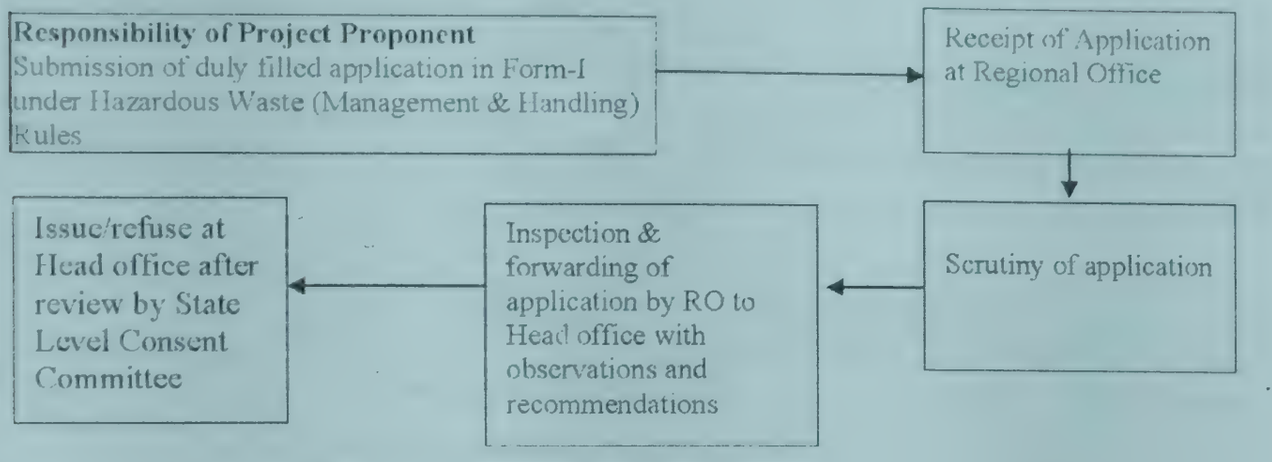
6.1.2. Consent for Operation (CFO)

Any person intends to establish or take any steps to establish any industry, operation or process or any treatment and disposal system or any extension or addition there to, which is likely to discharge sewage or trade effluent or bring into use new or altered outlet for a discharge of sewage and any person operating any industrial plan in the state as to have a previous consent of the State Board under the Water Act and the Air Act.



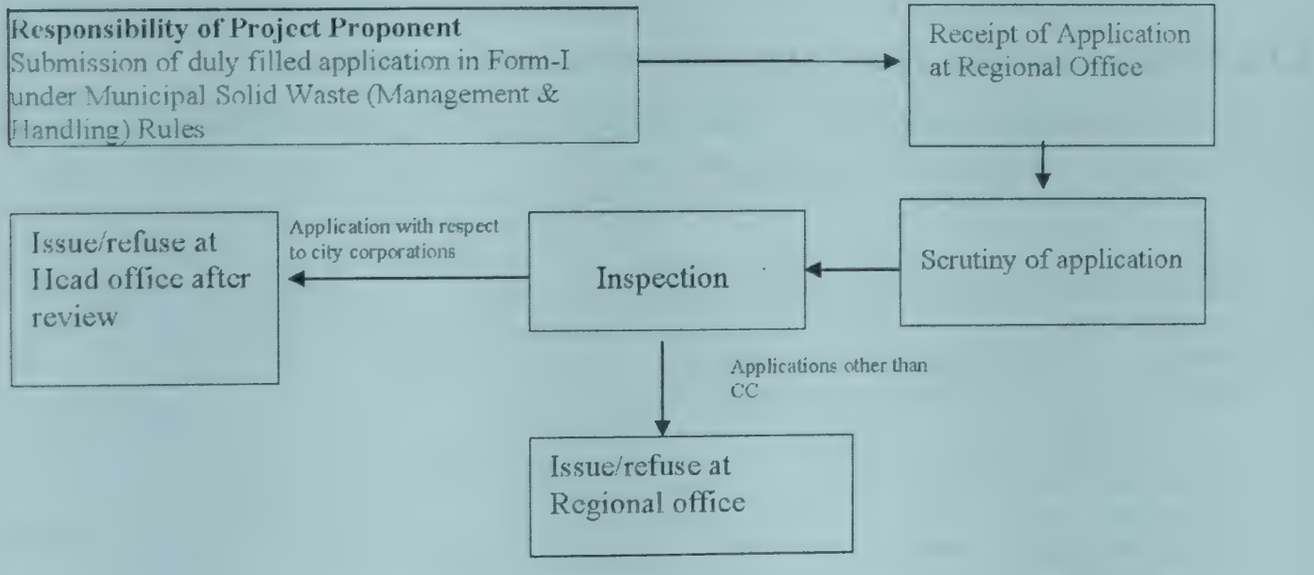
6.1.3 Authorization under Hazardous Waste Management Rules

Every occupier handling, or a recycler/ recycling hazardous waste and any person who intends to be an operator of a facility for collection, reception, treatment, transport, storage and disposal of hazadrous waste should obtain authorization from State Pollution Control Board.


Responsibility of Project Proponent
Submission of duly filled application in Form-I under Hazardous Waste (Management & Handling) Rules
Receipt of Application at Regional Office
Scrutiny of application
Inspection & forwarding of application by RO to Head office with observations and recommendations
Issue/refuse at Head office after review by State Level Consent Committee

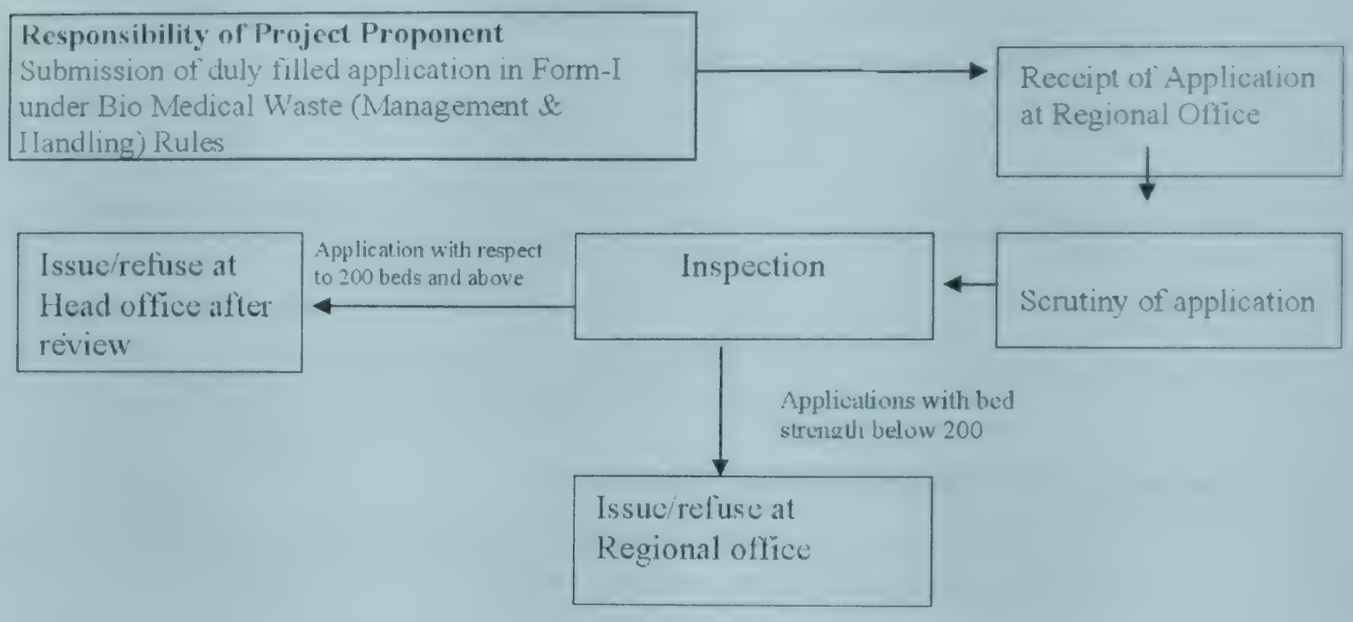
6.1.4. Authorization under Municipal Solid Waste Rules

It is the responsibility of the Municipal Authority or an operator of the facility to obtain authorization for setting up waste processing and disposal facility including land fills from the State Boards.


Responsibility of Project Proponent
Submission of duly filled application in Form-I under Municipal Solid Waste (Management & Handling) Rules
Receipt of Application at Regional Office
Scrutiny of application
Inspection
Application with respect to city corporations
Issue/refuse at Head office after review
Applications other than CC
Issue/refuse at Regional office

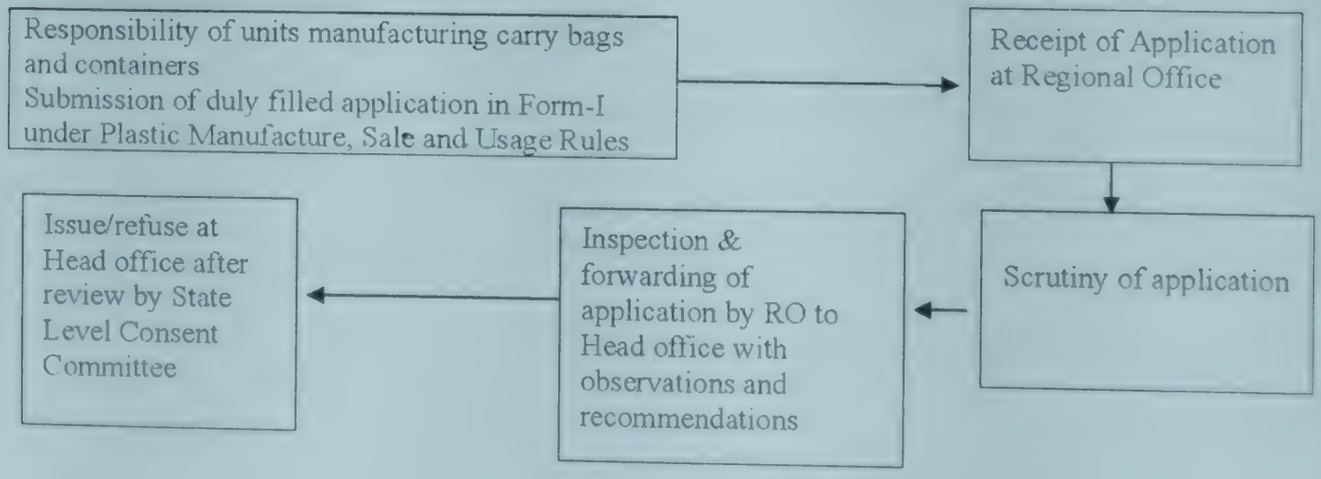
6.1.5. Authorization under Bio-Medical Waste Rules

Every occupier of an institution generating, collecting, receiving, storing, transporting, treating, disposing and / or handling bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1000 (one thousand) patients per month, shall make an application in Form I to the prescribed authority for grant of authorization.


Responsibility of Project Proponent
Submission of duly filled application in Form-I under Bio Medical Waste (Management & Handling) Rules
Receipt of Application at Regional Office
Scrutiny of application
Inspection
Application with respect to 200 beds and above
Issue/refuse at Head office after review
Applications with bed strength below 200
Issue/refuse at Regional office

6.1.6. Registration under Plastic Manufacture, Sale and Usage Rules

It is the responsibility of the units manufacturing carry bags and containers made of virgin or recycled plastic to register with State Pollution Control Board.


Responsibility of units manufacturing carry bags and containers
Submission of duly filled application in Form-I under Plastic Manufacture, Sale and Usage Rules
Receipt of Application at Regional Office
Scrutiny of application
Inspection & forwarding of application by RO to Head office with observations and recommendations
Issue/refuse at Head office after review by State Level Consent Committee

6.2. PERIODICITY OF CONSENT RENEWAL/AUTHORIZATION

Consent/authorization	Category of units	Validity period
CFE	Red - EIA category	5 years from the date of issue
	Red - Non EIA category	3 years from the date of issue
	Orange, Green	2 years from the date of issue
CFO	Red - Large, Medium	Once in two years
	Orange - Large	Once in Two years
	Orange - Medium	Once in Two years with an option for annual renewal
	Red,Orange- Small	Once in three years with an option for annual renewal
	Green - Large , Medium, Small	If the Capital investment is less than Rs. 100 lakhs - 10 year valid consent is issued by collecting one year consent fee If the Capital investment is more than Rs. 100 lakhs - 10 year valid consent is issued by collecting five year consent fee
Authorisation under BMW Rules	All category	Three years
Authorisation under HMW Rules	All category	One to Five years
Registration under Plastic Rules	All category	Three years

6.3. APPLICATIONS/FORMS & MINIMUM TIME REQUIRED FOR DISPOSAL OF COMPLETED APPLICATIONS/FORMS

Act/Rules	Application Form	Purpose	If the application and checklist are completed in all respect, KSPCB resolve to Issue/Refuse within
Water Act	Form - XIII	CFE for **Red** category under Water Act- EIA projects	120 days
		CFE for **Red** category under Water Act- non EIA projects with • investment more than Rs. 5 crores..... • investment less than Rs. 5 crores ..... CFO for Red category under Water Act with • investment more than 5 crores .... • investment less than Rs. 5 crores .... Orange and Green category	 60 days 45 days 60 days 45 days 21 days
	Form - OG	CFE for **Orange** & **Green** Category	21 days
Air Act	Form-I	CFE for **Red** category under Air Act- EIA projects CFE for **Red** category under Air Act- non EIA projects with • investment more than Rs. 5 crores..... • investment less than Rs. 5 crores ..... CFO for Red category under Air Act with • investment more than 5 crores .... • investment less than Rs. 5 crores ... Orange and Green category	120 days 60 days 45 days 60 days 45 days 21 days
	Form-OG	CFE for **Orange & Green** Category	21 days
	Form-I	CFO for Orange and Green category	21 days
Hazardous waste (management & handling) Rules.	Form - I	Authorization under **HWM** Rules	90 days

Bio medical waste (Management & Handling) Rules	Form - I	Authorization under **BMW** Rules for : • HCEs with less than 200 beds & veternery inst., blood banks, pathological lab, cliniks, diagnosis centers, animal houses ..... • HCEs more than 200 beds & common waste facilities	21 days 60 days
Plastic Rules	Form - I	Registration of unit for manufacture of plastic carrybags and containers	30 days

6.4. APPEALS AGAINST THE BOARD'S DECISIONS

If the occupier is not satisfied with the decision of the Board and if he feels that the decision is not as per the Statute, he may appeal before the concerned appellate authority mentioned below:

Type of action by the Board	**Appellate authority**
• Refusal of consent under Water Act & Air Act • Closure order under Air Act.	**Appellate authority** 6th Floor, Public Utility Building M.G. Road **Bangalore - 560 001**
• Closure order under Water Act • Restraining Order under Water Act and Air Act.	**Hon'ble High Court of Karnataka,** Bangalore
Refusal of authorization under HWM Rules	**Secretary to Government,** Department of Ecology and Environment, 7th Floor, M.S.Building, Bangalore - 01
Discrepancies in Cess assessment under Water Cess Act	**Chairman,** Karnataka State Pollution Control Board Parisara Bhavan, 49, Church Street **Bangalore - 560 001**
Refusal of authorization under BWM Rules	**Principal Secretary** Department of Forest, Ecology and Environment 4th Floor, Multi Storied Building Bangalore - 01

6.5. FORMS/RETURNS PRESCRIBED IN THE ENVIRONMENTAL LAWS

Act/Rule	Form No.	Purpose	When to file/ (yearly/half yearly) In case of returns date of filing & frequency	Remarks (Where the form/returns has to be submitted ex. KSPCB, CPCB, MoEF etc)
Municipal Solid Waste (Management & Handling) Rules, 2000	Form - I	For obtaining authorization for setting up waste processing and disposal facility including landfills.	Yearly	SPCB
	Form - II	Annual report	On or before 30th day of June every year	SPCB
	Form - IV	Annual report to the CPCB with regard to implementation of MSW (M&H) Rules 2000	15th of September every year	CPCB
	Form - V	In case of accident at any municipal solid waste collection		Secretary in-charge of the Urban Department in metropolitan cities, District Collector or Deputy Commissioner in all other cases.
Hazardous waste Management Rules	**Form 1** [Rules 3(2), 5(2) (3) and 5 (6) (ii)]	Application for obtaining Authorization for Collection/Reception/Treatment/Transport/ Storage/Disposal of Hazardous Waste	60 Days Before Expiry of Authorization	SPCB
	Form 3 [Rule 9 (1)]	Format for maintaining records of Hazardous Wastes at facility	Every Month	SPCB
	Form 4 [Rules 9 (2)]	Forms for filing returns Regarding Handling of Hazardous Waste	Yearly	SPCB

	Form 5 [Rule 10]	Accident Reporting & follow up	In case of Accident	SPCB
	Form 6 [Rule 13(1)]	Application for Importing Hazardous/Recyclable Wastes as Raw Materials	Before Importing	SPCB
	Form 6 (A) [Rule 13(8)]	Format for maintaining records of Hazardous Waste Imported and Exported		
	Form 7 [Rule 13(5) and (6)]	Transboundry Movement of Waste Notification	Before Transporting	Dir.Gen. Of Foreign Trade
	Form 7 (A) [Rule 12(5) and 14(4)]	Transboundry Movement of Waste Movement Document	For Each Transaction	Customs Authority
	Form 8 [Rule 7(3)]	Making of Hazardous Waste Containers		
	Form 9 [Rule 7(4) and (5)]	Hazardous Waste Manifest for Disposal	Every Transaction	SPCB
	Form 10 [Rule 7(7)]	Transport Emergency (TREM) Card	For Each Transport	
	Form 11 [Rules 19(2) and 19(6)]	Application for Grant/Renewal of Registration for Recycling/Re-Refining Non Ferrous Metal Waste/Used oil/ Waste Oil	Before Commissioning Plant	CPCB
	Form 12 [Rules 19(13)]	Form for Filing Returns by Recyclers/Re-Refiners of Non Ferrous Metal Waste/Used oil/ Waste Oil	Yearly	SPCB
	Form 13 [Rules 20(5)]	Filing Returns of Auction /Sale of Non Ferrous Metal Waste/Used oil/ Waste Oil	Every Transaction	SPCB
Water Cess Act	**Form-I**	To furnish quantity of water used .	Returns shall be submitted on or before the 5th of every calendar month	SPCB

Environment (Protection) Rules	**Form-V**	Environmental statement	Before 30th September of every year for the previous financial year ending 31st March.	SPCB
Bio medical waste management Rules	**Form-I**	To obtain authorization for Generation, Collection, Reception, Storage, Transportation, Treatment, Disposal and/or handling Bio-medical waste	Once in 3 years.	SPCB
	Form-II	Annual report	Every year before 31st January	SPCB
Plastic Rules	**Form-I**	To obtain registration for manufacture of plastic carry bags and containers	Once years in three	SPCB

6.6. DEFINITION OF CAPITAL INVESTMENT

(As per Rule 32 of Karnataka Water Rules)

(a) **Capital Investment for existing industry,-**

Capital Investment of any existing industry shall be the gross fixed assets of the industry as shown in the fixed schedule of the audited report for the year 1993 consisting of investment made on land, building (including staff quarters), plant and machinery, goodwill and other movable and immovable assets, additions made during subsequent year. Any additional capital investment made after the year 1983 as reflected in the fixed asset schedule of subsequent audit reports shall also be considered towards capital investment.

(b) **Capital Investment for a new Industry to be established or taking any steps to establish** - Capital Investment on land, buildings, staff quarters, plant and machinery including all movable and immovable assets as detailed in the project report.

(c) **Capital Investment when land and/or building or any other Assets are taken on lease,-**

Twenty times the annual lease value is to be taken as equivalent to capital investment.

- All Local Bodies, apartments, & layouts shall pay consent fee based on the population as under:

Sl.No.	Population of Local Authority	Fees in Rupees
1.	Not exceeding 50,000	250
2.	Exceeding 50,000 but not exceeding 1,00,000	500
3.	Exceeding 1,00,000 but not exceeding 5 lakhs	1500
4.	Exceeding 5 lakhs but not exceeding 10 laksh	2500
5.	Exceeding 10 laksh	5000

Software Units.-

- Classified under green category.
- If the unit possess air pollution source like generator etc., consent under Air Act is mandatory.

- If the employees are more than 20 numbers, consent under Water Act is mandatory.
- In case of industrial Park/complexes of information technology having common facilities, single consent for the entire complex could be obtained in place of individual unit.
- The developer/proprietor is responsible for obtaining consents.
- Consent fee under Air Act is based on investment mad on all the air pollution sources.
- Consent fee under Water Act is based on investment on equipments only.
- Validity of consent - Once in a year. Occupier can also avail consent for 5 years by paying 5 years consent fee.

Mini Hydel Power Plants.-

- Classified as Green category.
- Hydel projects have to obtain consent under Air Act & Water Act respectively if it posses air pollution source such as Generator etc., and if the number of employees are more than 20 in number.
- Consent fee payable is on investment on air pollution sources only under Air Act. Consent for under Water Act is based on the investment made on land utilized for office building and staff quarters including investment made on office & staff quarters buildings.
- Validity of consent – Once in a year. Occupier can also avail consent for 5 years by paying 5 years consent fee.

Wind Power Project.-

- Classified as Green category.
- Has to obtain consent if the air pollution sources like Generator etc., are installed. Also, if the number of employees is more than 20 in number, consent under Water Act is also required to be obtained.
- Consent fee payable under Water Act is on investment made on land utilized for office building & staff quarters including investment made on the buildings like office & staff quarters.
- Consent fee payable based on air pollution sources like D.G. Sets shall be charged based on investment made on air pollution source only.
- Validity of consent is every year. The project can also avail 5 years consent by paying 5 years consent fee.

Floriculture.-

- Classified as Green category.
- Has to obtain consent if there is any air pollution sources and it the units has more than 20 employees.
- Consent fee payable is based on investment made on industrial activity only i.e., cold storage area, generator sets, office building, staff quarters and land utilized for industrial activity.
- Validity of consent is for one year. The unit can also seek consent for 5 years if by paying 5 years consent fees.

6.7. CONSENT FEE STRUCTURE

Capital investment by industries	Consent fee in rupees for different categories of industries		
	Red	Orange	Green
Exceeding Rs.1000 crores	2,00,000	1,75,000	1,50,000
Exceeding Rs.500 crores but not exceeding rupees 1000 crores	1,50,000	1,25,000	1,00,000
Exceeding Rs.250 crores but not exceeding rupees 500 crores	1,00,000	90,000	75,000
Exceeding Rs.50 crores but not exceeding rupees 250 crores	75,000	60,000	50,000
Exceeding Rs.25 crores but not exceeding rupees 50 crores	50,000	40,000	30,000
Exceeding Rs.10 crores but not exceeding rupees 25 crores	30,000	25,000	20,000
Exceeding Rs.5 crores but not exceeding rupees 10 crores	20,000	17,500	15,000
Exceeding Rs.1 crore but not exceeding rupees 5 crores	15,000	12,500	10,000
Exceeding Rs.50 lakhs but not exceeding rupees 1 crore	6,000	5,000	4,000
Exceeding Rs.25 lakhs but not exceeding rupees 50 lakhs	3,000	2,500	2,000
Exceeding Rs.10 lakhs but not exceeding rupees 25 lakhs	2,000	1,750	1,500
Exceeding Rs.5 lakhs but not exceeding rupees 10 lakhs	1,500	1,250	1,000
Exceeding Rs.1 lakhs but not exceeding rupees 5 lakhs	500	250	200
Rupees one lakh and below	200	150	100

Note : Consent fee in respect of Hospitals serving public without collecting any charges shall be Rs 1000/- per annum irrespective capital investment.

6.8. CLASSIFICATION OF INDUSTRIES

The Board has categorized industries into 3 categories based on pollution potential

Red : Highly polluting units;

Orange : Moderately polluting;

Green : Less polluting

6.8.1. RED CATEGORY OF INDUSTRIES

Sl. No.	Categorization of industries effective from 1.4.2005
1.	Nuclear power and related projects such as Heavy Water Plants, Nuclear Fuel Complex, Rare Earths.
2.	River valley projects including hydel power, major irrigation and their combination including flood control.
3.	Ports, Harbours, Airports (except minor ports and harbours).
4.	Petroleum Refineries including crude and product pipelines.
5.	Petrochemical complexes (both Olefinic and Aromatic) and petrochemical intermediates such as DMT, Caprolactam, LAB etc., and production of basic plastics such as LDPE, HDPE, PP, PVC.
6.	Petroleum storage, gas filling and transfer facilities.
7.	Chemical fertilizers (Nitrogenous and Phosphatic other than single superphosphate).
8.	Pesticides (Technical) (except formulation).
9.	Bulk drugs and pharmaceuticals (except formulation).
10.	Exploration for oil and gas and their production, transportation and storage.
11.	Synthetic rubber.
12.	Asbestos and Asbestos products.
13.	Hydrocyanic acid and its derivatives.
14.	(a) Primary metallurgical industries (such as production of Iron and Steel, aluminium, Copper, Zinc, Lead and Ferro Alloys) (b) Electric arc furnaces (mini steel plants) (c) Ferrous and Non-Ferrous metal extraction.
15.	Dry coal processing/mineral processing industries like ore sintering, benefication, pellatisation, etc.
16.	Coke oven by-products and coal tar distillation products.
17.	Coke making, coal liquification and fuel gas making industries.
18.	Chlor-alkali industry.
19.	Integrated paint complex including manufacture of resins and basic raw-materials required in the manufacture of paints
20.	Paints, enamels and varnishes.
21.	Viscose staple fibre and filament yarn.

22.	Storage batteries integrated with manufacture of oxides of lead and lead antimony alloy.
23.	Thermal power plants (including coal, oil, nuclear, agro waste, etc., and barge mounted, co generation).
24.	Mining projects (major minerals) with lease area more than 5 hectares.
25.	Highway projects.
26.	Tarred roads in Himalayas and/or Forest areas.
27.	Distilleries (except re-distilling and bottling).
28.	(a) Raw Skins and Hides (including processing of internal organs)/(b) Unhairing, soaking, Deliming, Bating of hides.
29.	Slaughtering of animals, rendering of bones, washing of meat and meat processing.
30.	Leather industry including tanning and processing.
31.	(a) Pulp, Paper and Newsprint. (b) Kraft paper mills. (c) Manufacture of pulp-wood pulp, mechanical and chemical (including dissolving pulp).
32.	Dyes & Dye Intermediates.
33.	Pigment dyes and their intermediates.
34.	Foundries (individuals).
35.	Electroplating.
36.	Surface coating industries.
37.	Bleaching.
38.	Degreasing.
39.	Phosphating.
40.	Pickling and Tanning.
41.	(a) Miscellaneous glassware without involving use of fossil fuel combustion. (b) Glass and Glass products involving use of coal.
42.	Surgical and medical products containing prophylactics and latex products.
43.	Instant Tea/Coffee processing.
44.	Glue and Gelatin. **(Except vegetable glue)**
45.	Metallic Sodium.
46.	Manufacture of photographic films, papers and photographic chemicals including film processing.
47.	Phosphate rock processing plants.
48.	(a) Cement plants with horizontal rotary kilns including bagging. (b) Cement plants with vertical shaft kiln technology.
49.	Manufacture of lubricating oils and grease.
50.	Vanaspathi, hydrogenated vegetable oils and industrial purposes.
51.	Sugar Mills (white and khandasari).
52.	Potash manufacturing.
53.	Electro-thermal products (artificial abrasives, calcium carbide, etc.).
54.	Phosphorous and its compounds.
55.	Acids and their salts (organic & inorganic).
56.	Nitrogen compounds (cyanides, cyanamides and other nitrogen compounds).
57.	Explosives (including industrial explosives, detonators and fuses).

58.	Phthalic anhydride.
59.	Processes involving chlorinated hydrocarbon.
60.	Chlorine, fluorine, bromine, iodine and their compounds.
61.	Synthetic fibres.
62.	Fibre glass production and processing.
63.	Industrial carbons (including graphite electrodes, modes, midget electrodes, graphite blocks, graphite crucibles, gas carbons, activated carbon, synthetic diamonds, carbon black, channel black, lamp black, etc.)
64.	Electro-chemicals.
65.	Polypropylene.
66.	Chlorates, Perchlorates and Peroxides.
67.	Synthetic resin and plastic products.
68.	Dyeing & Printing.
69.	Chemical industries.
70.	Cooking of fibres & digesting.
71.	Pulping and fermenting of coffee beans.
72.	Processing of fish.
73.	Vegetable oil refinery.
74.	Manufacture of soaps & detergents.**(Except tiny/cottage unit)**
75.	Manufacture of insecticides,fungicides, herbicide and pesticides.
76.	Natural Latex. **(Excluding tiny/cottage unit)**
77.	Hazardous waste processing facilities and dump sites.
78.	All barge-mounted power plants.
79.	Import & storage of hazardous chemicals.
80.	Import and storage of oil.
81.	Paint manufacture.
82.	Lead refining.
83.	Vinyl resin.
84.	Engineering industries (with electroplating and heat treatment).
85.	Holiday Resorts, Beach Resorts & Jungle Resorts. **(With electroplating)**
86.	Tourism projects coming under CRZ.
87.	Incineration plants.
88.	Abattoir.
89.	Wire drawing process involving pickling etc., except cold process
90.	Electric bulb filament processing.
91.	Mining and quarry industries.
92.	Tyre manufacture.
93.	Composite textile processing (except spinning).
94.	Printed circuit board manufacturing units.
95.	Fish processing with peeling.
96.	Hotels with electroplating.
97.	Paper board and straw boards **manufactured using pulp.**

98.	Galvanizing.
99.	Formulation of **Pesticide,** herbicide, insecticide, & fungicide
100.	Aquaculture pond including prawn hatcheries.
101.	Separation of milk and whey.
102.	Manufacture of Chocolate, cocoa, mass etc., (Other than confectioneries).
103.	Common disposal facility – hazardous waste, bio medical waste
104.	Liquid propulsion & rocket testing facility
105.	All CETP's
106.	Polyster filming yarn
107.	Audio & video film processing including polyester film processing
108.	Shaving blade manufacturing
109.	Automobile body building with metal processing
110.	Fire Crackers
111.	Tobacco products including cigarettes and tobacco processing
112.	Naval Base
113.	Rubber reclaiming
114.	Lime kilns
115.	Refractories
116.	Nylon Plants
117.	Stone crushers
118.	Dairy
119.	Food Processing
120.	CNS Shell oil manufacture
121.	Hospital, nursing homes, veterinary hospitals diagnostic laboratories covered under BMW Rules organizations
122.	Composting of Press mud using Spent Wash
123.	Manufacture of Office & Household equipments and appliances using fossil fuel for combustion
124.	Manufacture of Organic nutrients including use of spent wash from disyillery.
125.	Manufacture of Bio fertilizers involving spent wash
126.	Msnufacture of Bio Pesticides.
127.	Bio mass power generation
128.	Meta Amino Phenol
129.	Research laboratories involving chemicals/animals
130.	Recycling of Ferrous / non ferrous metal units covered under HWM Rules
131.	Recycling of spent oil/used oil covered under HWM Rules
132.	Municipal Solid Waste treatment and disposal facility
133.	Coke oven plant
134.	Sponge iron unit
135.	Hot mix plants
136.	Lead Recycling units involving melting.
137.	Independent ore / mineral crushing units

6.8.2. Orange category of industries

Sl.	Re-Categorization of industries effective from 1.4.2005
1.	Manufacture of Office and Household equipments and appliances **without use** of fossil fuel.
2.	Distillation of alcohol/stillage evaporation.
3.	Manufacture of mirror from sheet glass and photo framing.
4.	Surgical gauges and bandages.
5.	Automobile servicing and repair stations.
6.	Formulations of pharmaceuticals.
7.	Potassium permanganate.
8.	Fragrance, flavours and food additives.
9.	Flour Mills **with wastewater generation**.
10.	Washing of fabric.
11.	Trimming, cutting, juicing and blenching of fruits and vegetables (fruit processing, pulping, etc.).
12.	Washing of equipments and regular floor washing using considerable cooling water.
13.	Steeping and processing of grain.
14.	Filtration, centrifugation and distillation.
15.	DM plant exceeding 20 Kilo Liters per day capacity.
16.	Solvent extraction plants (excluding refining).
17.	Hotels with laundry.
18.	Rerolling Mill.
19.	Ceramic tiles and products (other than small ceramics).
20.	Milk chilling center.
21.	Shell grit and shell grit powder.
22.	Hatcheries.
23.	Cattle feed and poultry feed.
24.	IMF bottling plant.
25.	Plywood manufacturing particle boards & veneers.
26.	Engineering industries with spray painting (without electroplating and heat treatment).
27.	Automobile leaf springs.
28.	Foam rubber.
29.	Fenny manufacture.
30.	Pulverising activity.
31.	Tamarind powder.
32.	Sago units.
33.	Salt manufacturing units.
34.	Malted food (except packing)
35.	Washing of Fabric & Jean washing & laundry
36.	Fish processing without peeling.
37.	Boiled rice (steamed)
38.	Surgical and Medical Products not containing prophylactics and latex product.
39.	Vegetable glue.

40.	Blending of Lubricating Oils and Grease.
41.	Gherkin Industries.
42.	Industrial estates/ areas.
43.	Holiday Resorts/ Jungle resorts with laundry.
44.	Mining of Minor Minerals.
45.	Industrial gases other than Nitrogen, Oxygen and Carbon di-Oxide.
46.	Stone cutting and polishing using water.
47.	Arrack bottling
48.	Soft drinks, aerated waters excluding pulp based with production capacity more than 10,000 bottles of 300 ml equivalent/ bottle
49.	Mineral water more than 10,000 Liters/day
50.	Mechanized Concrete batch mixing plants
51.	Cement bulk storage attached with bagging plant/bulk supply in tankers

6.8.3. Green category of industries

SL No	Item No	Re-Categorization of industries effective from 1.4.2005
1.	1.1	RCC Railway Sleepers
	1.2	Pre Cast RCC members such as Columns, Electrical poles, Chejjas,
	1.3	RCC Spun Pipes, Hollow bricks
	1.4	Mosaic tiles
	1.5	Inter locking paving blocks
	1.6	Fly ash bricks
2.		
	2.1	Manual and wire cut bricks
	2.2	Roofing tiles, ridges, decorative tiles
	2.3	Terra-cotta
	2.4	Stone ware pipes
	2.5	Refractory bricks
3.		Cashew Nut Processing including cashew roasting
4.		Coffee curing, roasting and grinding
5.		Tea Leaf processing including re-packing
6.	6.1	All hotels, Bar & Restaurants, resorts (without laundry and electroplating Not located in CRZ areas, reserve forests & not included in EIA Notification)
	6.2	Kalyanamantapams & Community Halls.
7.		Industries under Item No 7.1 to 7.7 without washing dyeing, and other water based finished operation
	7.1	Garment Stitching
	7.2	Label manufacturing
	7.3	Cotton & Woolen Hosiery apparels
	7.4	Cotton knitting including Socks, Shoe lace
	7.5	Cotton spinning, yarn doubling & weaving

	7.6	Handlooms & power looms
	7.7	Carpet Weaving
	7.8	Silk twisting (excluding dyeing & de-gumming)
8.		Industries Under Item No. 8.1 to 8.4 Excluding tanning operations
	8.1	Ready made leather garments
	8.2	Stitching of shoe uppers
	8.3	Assembly of shoes & leather chappals
	8.4	Conversion of finished leathers such as manufacture of bags, suitcases, etc
9.		Items No 9.1 to 9.5 without Rubber reclaiming/reprocessing
	9.1	Tread rubber including pre-cured rubber
	9.2	Tyre retreading (Cold & Hot process)
	9.3	Rubber tubes
	9.4	Rubber foot wear
	9.5	Rubber molded articles like gasket, washers, Rubber mats, rollers etc.
10.		Poultry Farms & hatcheries excluding prawn hatcheries
11.		Flori-cultures & Horticultures
12.		Block making printing offset printing, Book binding, Screen Printing
13.		Rice Hulling & Phova manufacturing industries
14.		
	14.1	Wooden furniture, carpentry units
	14.2	Steel furniture manufacturing without powder coating units & without generation of trade effluents
	14.3	Bamboo & cane products
	14.4	Saw mills
	14.5	Manufacturing of veneer only
15.		Fish net manufacturing without dyeing
16.		Automobile body building without generation of trade effluents, repair shops without water washing, wheel alignment centers
17.		Body building of wooden boats & trawlers
18.		Assembly units under Item No. 18.1 to 18.7 (without electroplating, heat treatment, surface finishing such as pickling, Phosphating, de-rusting, degreasing, PCB manufacturing)
	18.1	Electrical appliances including washing machines & refrigerators including other home appliances
	18.2	Electronic equipment such as TV's, Radios, VCR, UPS, Computer, Telephones, electronic toys, etc,
	18.3	Air Coolers, Air Conditioners
	18.4	Bicycle assembly
	18.5	Motor & Pumps without foundry
	18.6	Transformer assembly, Motor rewinding
	18.7	Weighing machines

19.		Tablets, capsules formulations (dry process)
20.		Ground nut decorticating units
21.		Manufacturing of agro-based fuel briquettes
22.		Item No. 22.1 to 22.4 without recycling
	22.1	PVC pipes, HDPE pipes etc., by extrusion
	22.2	Plastic injection/ extrusion molding
	22.3	Plastic sack bags, woven sack with HDPE, LDPE, Polythene bags (without recycling plastic)
	22.4	Assembly of plastic components for making toys etc.
23.		Ice blocks manufacturing, cold storage & refrigeration rooms
24.		Vegetable Oil expellers without refinery & solvent extraction
25.		Bakery products, biscuits, confectionery (without Cocoa processing), vermicelli, Fryums
26.		Welding electrodes
27.		Dal Mills, grams roasting, drying
28.		Re- packing of finished products (Dry products)
29.		Soft drinks, aerated waters excluding pulp based with production capacity less than 10,000 bottles of 300 ml equivalent/ bottle (without **caustic** washing)
30.		Wind power projects
31.		Snuff manufacturing, Beedi manufacturing, chewing tobacco
32.		Umbrellas Assembly, rain coat stitching, tarpaulin stitching
33.		Atta chakkies, chilly & masala powder, powdering of spices
34.		General Engineering Industries (Excluding electroplating, heat treatment, forging, casting, pickling, de-greasing, Phosphating, de-rusting, quenching)
35.		Jaggery manufacturing
36.		Motor rewinding
37.		Mineral water less than 10,000 Liters/day
38.		Industrial gases (only Nitrogen, Oxygen & Carbon Dioxide)
39.		Laboratory ware including glass blowing
40.		Optical frames without electroplating
41.		Wax Candles (excluding manufacturing of waxes)
42.		Betel Nut process
43.		Utensils, Brass, Aluminum, Bronze
44.		Cotton ginning
45.		Black smithy without foundries
46.		Brush making with fibres / Plastic
47.		Hair sizing
48.		Building accessories such as padlocks, tower bolts, Nails, Screws without electroplating
49.		Paper pins, u-clips, pen holders, pencils, pen & paper products without electroplating
50.		Sports Goods
51.		Panel Board, Switches without electroplating
52.		Plastic Cable manufacturing

53.	Agarbathi Manufacturing
54.	Dry distempers without kilns / furnace
55.	Manufacture of corrugated box and cartoons using paper
56.	Fiber glass molding, Fiber Glass reinforced plastic
57.	Safety Match sticks
58.	Coir Units (without soaking) & Coir furnishing units
59.	Ropes (cotton, Plastic & Coir)
60.	Stone Cutting (without using water)
61.	Paint formulations
62.	Apartments
63.	Cinema Theaters
64.	Commercial Complexes
65.	Telephone Towers
66.	Office Complex/Banks
67.	Formulation Organic Nutrient without the use of spent wash from distillery.
68.	Manufacture of Soaps and Detergents in tiny/cottage sector.
69.	Natural Latex in tiny/cottage
70.	Flour mill involving dry process.
71.	Manufacture of Bio-fertilizer not involving spent wash.
72.	Formulation of Bio- Pesticides.
73.	Research laboratories not involving chemicals/animals.
74.	STP's Provided in Organizations for which there is no specific classification
75.	Gutka Packing units
76.	Software units
77.	Constructions projects covered under EIA notification excluding projects like Hospitals, hotels etc for which there is specific classification
78.	Hydel power plants/Canal power projects not covered under EIA notification
79.	Ice cream units only tiny sector
80.	Plastic units covered under Plastic Rules 1999, 2003
81.	Fabrication units with painting without generation of trade effluents
82.	Ayurvedic, Unani, Sidda medicine manufacturing units without solvent extraction process
83.	Cattle feed/poultry feed supplement manufacturing units (without the use of molasses)

7 ENVIRONMENT MANAGEMENT TOOLS

7.1. ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)

EMS is an important management tool, which help organizations to improve their environmental performance. Growing world wide concern for environment protection and the Globalization of the economy has made it imperative for many companies, especially multinationals, to voluntarily adopt EMS and use Environmental auditing as a means of resource conservation and pollution prevention, thus improving their competitive advantage and also image.

Beside the market pressures, regulatory agencies have also started considering EMS as a means of self-regulation. As more and more organizations adopt EMS, the enforcement burden on the regulatory agencies gets reduced. Therefore, steps are being taken to promote the adoption of EMS in organizations through incentives. In some States it is made compulsory.

KSPCB therefore, believes that by establishing an EMS, an organization will be able to proactively address all the legal and other environmental issues which are of concern both for the Board as well as the community around it. Thus an organization with EMS will work like a partner in achieving the overall objective of preventing pollution and resource conservation leading to sustainable development.

The ISO 14001 developed by International Standard Organisation provides a frame work for developing EMS.

At present the adoption of ISO 14001 model EMS is confined only to the industry sector that too few large industries. The small and medium enterprises are yet to appreciate the need for such systems. The concept is new for other sectors of economy though equally important form the environmental point of view like mines, hospitals, local bodies and others as well as Government organizations/institutions.

In this background an EMS Promotion Cell is established within KSPCB with the objective of popularizing and promoting the concept and principles of EMS in all sectors of economy in the State.

What EMS promotion Cell will do?

- Acts as a resource and information centre on EMS
- Promotes EMS in industries and other organizations both in private and public sector including government establishments in the State through awareness and other capacity building activities.
- Sanctions financial assistance of Rs. 35,000/- to Red category SMEs which obtain ISO 14001 certificate.
- Organises periodic interaction with certified units, other interested organizations, associations and individuals to facilitate experience sharing and to popularise best practices in EMS
- Build capacity within the Board on EMS Principles in its day-to-day working to make enforcement activities more effective
- Organises periodic interactions with industry sectors to strengthen the auditing and reporting mechanism to make the environmental statements more meaningful and useful for both industry and Board
- Analyse the Environmental Statements furnished by industries, sector wise and disseminate the best practices through publications.

7.2 CHARTER ON CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP)

(Issued by Ministry of Environment & Forest & CPCB in March 2003)

7.2.1 ALUMINIUM INDUSTRY

Sl. No.	Issues	Action Points	Targets
1	Technology	Allowing new Potlines only with Pre-baked Technology MoEF, after June 2003, only	Environmental clearance for new potlines to be given by with pre-baked technology.
2	Fluoride Emissions	Prescribing maximum size of the plant	Maximum size of the plant shall be decided based on the assimilative capacity of each plant location.
		Revision of fluoride emission standards	**For Soderberg Technology** 2.8 kg/t by December 2005 [1.0 kg/t (VSS) & 1.30 kg/t (HSS) by December 2010]* **For Pre-baked Technology 0.8 kg/t** By December 2006
		Phasing out Wet Scrubbing System for fluoride Allowing new Potlines only with Dry Scrubbing System	Environmental clearance for new potlines shall be given by MoEF, after June 2003, only with Dry Scrubbing System.
		Monitoring of fugitiveemissions from pot rooms	To start with Indal or any other better method & submit data from January 2004, regularly to SPCBs & CPCB
3	Fluoride Consumption	Fluoride consumption per tonne of aluminium produced (as F)	**[For Soderberg Technology** 15 kg/t by December 2005 **For Pre-baked Technology** 10 kg/t by December 2005]*
4	Ambient Fluoride	Forage fluoride standards	• Twelve consecutive months average - 40 ppm • Two consecutive months Average - 60 ppm • One month - 80 ppm
		Measurement of forage fluoride	To start monitoring and submit data from January 2004, regularly to SPCBs & CPCB.

			The locations of monitoring may be selected in collaboration with SPCBs & CPCB
5	Spent Pot Lining (SPL)	Setting up a centralized SPL treatment & disposal facility with aluminium fluoride recovery and utilization of SPL in steel / cement industries	[Proposal to be prepared]*
		Limit for pot life (for new pots installed after December 31, 2003	[2500 days (average)]*
		SPL (Carbon & Refractory) to be disposed in Secured Landfill	With immediate effect
6	Red Mud	Phasing out Wet disposal	To achieve minimum 50% solids in red mud by Dec 2005
		Red Mud Utilisation	A proposal for practical utilisation to be prepared by Aluminium Association of India within six months
7	Anode Baking Oven	Achieving particulate matter limit of 50 mg/Nm3	By Dec. 2005

7.2.2 CEMENT INDUSTRY

1. Cement Plants, which are not complying* with notified standards, shall do the following to meet the standards:
   - Augmentation of existing Air Pollution Control Devices - by July 2003
   - Replacement of existing Air Pollution Control Devices - by July 2004
2. Cement Plants located in critically polluted or urban areas (including 5 km distance outside urban boundary) will meet 100 mg/Nm^3 limit of particulate matter by December 2004 and continue working to reduce the emission of particulate matter to 50 mg/Nm^3.
3. The new cement kilns to be accorded NOC/Environmental Clearance w.e.f. 01.04.2003 will meet the limit of 50 mg/Nm^3 for particulate matter emissions.
4. CPCB will evolve load based standards by December 2003.
5. CPCB and NCBM will evolve SO_2 and NOx emission standards by June 2004.
6. The Cement industries will control fugitive emissions from all the raw material and products storage and transfer points by December 2003. However, the feasibility for the control of fugitive emissions from limestone and coal storage areas will be decided by the National Task Force (NTF). The NTF shall submit its recommendations within three months.
7. CPCB, NCBM, BIS and Oil refineries will jointly prepare the policy on use of petroleum coke as fuel in cement kiln by July 2003.
8. After performance evaluation of various types of continuous monitoring equipment and feed back from the industries and equipment manufacturers, NTF will decide feasible unit operations/sections

for installation of continuous monitoring equipment. The industry will install the continuous monitoring systems (CMS) by December 2003.

9. Trippings in kiln ESP to be minimized by July 2003 as per the recommendation of NTF.
10. Industries will submit the target date to enhance the utilization of waste material by April 2003.
11. NCBM will carry out a study on hazardous waste utilization in cement kiln by December 2003.
12. Cement industries will carry out feasibility study and submit target dates to CPCB for co-generation of power by July 2003.

* Non complying units shall give bank guarantee to respective SPCBs.

7.2.3 CHLOR-ALKALI INDUSTRY

1. Complete recycling of mercury bearing effluent by December 2003.
2. Installation of continuous on-line mercury analyzer by June 2003.
3. Treatment of cell-room ventilation gas - limit for mercury not to exceed 1 gm/t of product by December 2005.
4. De-mercurisation of caustic soda & limit for mercury in caustic soda at 0.1 gm / of product by December 2004.
5. Reduction of mercury in H_2 gas at 0.5 gm/t by December 2004.
6. Installation of common full-fledged salt washery unit at source by Dec. 2003.
7. Capping of existing completed disposal sites by June 2004 (Action plan to be submitted by June 2003).
8. Installation of mercury distillation units by June 2003.
9. Brine sludge treatment and water leachable mercury content in brine mud at < 0.1 mg/l before disposal in Secured Landfill.
10. Reduction of mercury consumption at < 50 gm/t of product by December 2005.
11. Total mercury release to environment at < 2.0 gm/t of product by December 2005.
12. The mercury cell plants will switch over to membrane cell technology in a time bound manner for which action plan will be prepared by respective plants within six months.
13. Industry to submit action plan covering the pollutional and safety aspects for Cl_2 handling to prevent any accident / release of Cl_2, within three

7.2.4 COPPER INDUSTRY

1. To meet SO2 emission limit (2 kg / tonne of H_2SO_4 produced), 50 mg / Nm^3 of acid mist by December 2005. Action plan to be submitted by July 2003.
2. SO_2 Emissions monitoring: Installation / Proper operation, maintenance and calibration of continuous SO_2 monitoring system by 30th June 2003.
3. Proper operation and maintenance of tailing dams.
4. Wastewater treatment and disposal: To achieve Zero discharge through 100% recycle/reuse of treated wastewater by 31st Dec. 2003.
5. House Keeping: To reduce the generation of fugitive dust from vehicle movement and improve overall house keeping by 31st Dec. 2003.
6. Green Belt: To develop canopy based green belt around the periphery of plant and township as per CPCB guidelines.

7.2.5 DISTILLERIES

Existing Molasses – Based Distilleries

Noncompliant distilleries will furnish bank guarantee* and Action Plan to concerned State Boards to ensure compliance with any or combination of the following measures:

- Compost making with press mud/agricultural residue / Municipal Waste;
- Concentration and drying / Incineration;
- Treatment of spentwash through biomethanation followed by two stage secondary treatment and dilution of the treated effluent with process water for irrigation as per norms prescribed by CPCB / MoEF;
- Treatment of spentwash through bio-methanation following by secondary treatment (BOD < 2500 mg / l) for controlled discharge into sea through a proper submerged marine outfall at a point permitted by SPCB / CPCB in consultation with National Institute of Oceanography (NIO), so that Dissolved Oxygen in the mixing zone does not deplete, less than 4.0 mg/l;
- For taking decision on feasibility of one time controlled land application of treated effluent, a study will be undertaken within three months.

The road map for utilization of spentwash by the distilleries to achieve zero discharge of spentwash in inland surface water courses will be as below:

50% utilization of spentwash —— By March, 2004

75% utilization of spentwash —— By March, 2005

100% utilization of spentwash —— By December, 2005

Till 100% utilization of spentwash is achieved, controlled and restricted discharge of treated effluent from lined lagoons during rainy season will be allowed by SPCB/ CPCB in such a way that the perceptible colouring of river water bodies does not occur.

Monitoring

Task Force consisting of CPCB, SPCB, Experts and industry shall be constituted for monitoring the implementation of action points.

New Distilleries & Expansion of Existing Distilleries (Mollasses based)

Proposal for Standalone new distilleries and expansion of existing distilleries without achieving zero discharge in surface water / ground water will not be considered by MoEF /SPCB.

*** To be decided by SPCBs/CPCB/MoEF.**

7.2.6 DYES & DYE INTERMEDIATES

Wastewater Management

1. Industry Associations will conduct feasibility study for adoption of cleaner technologies for H-Acid manufacture (catalytic hydrogenation and others) within one year.
2. Industries will submit a proposal for recovery and purification of by-products by June 2003.
3. Dye intermediate industries will install salt recovery systems in case of sodium sulphate and reuse recovered salt in the process by December 2003.

4. An action plan for installation/up-gradation of incineration systems as per CPCB guidelines to handle concentrated wastewater and reuse of treated weak wastewater will be submitted within six months.
5. Industry Associations will encourage waste exchange for proper use of weak acids. (Action within one year).
6. Wherever possible, waste generated from one industry will be utilized by others (e.g. use of effluent generated from Vinyl Sulphone plant in H-Acid plant). Action plan in this regard will be submitted by April 2004.
7. Industries will regularly monitor ground water quality. This will be initiated immediately.
8. H-Acid industries will examine the feasibility to increase product yield from 1.09 to 1.86 for reducing iron sludge, within six months.
9. In case of dyestuff, wherever possible (to be decided by the Task Force within six months), industries will use spray drying instead of salting to minimize load on Effluent Treatment Plants.
10. Industries will submit proposal on adoption of waste minimization practices by June 2003.
11. Existing standards will be reviewed in consultation with industries. Action in this regard will be taken within six months.

Air Pollution Management.-

1. Industries will minimize loss of volatile organics (solvent recovery of at least 90%) either individually or collectively. An action plan will be submitted by June 2003.
2. Scrubbing systems for SOx and NOx emissions will be upgraded by July 2003

Solid Waste Management.-

Proper on-site storage facilities and final disposal of solid waste on secured landfill will be ensured immediately.

Better Management Practices.-

Improvement of house keeping such as concreting of floors, sealing of breaches/leakages in the system, replacement of corrosive pipelines, etc. to prevent spillages, leakages, fugitive emissions will be done in three months.

7.2.7 FERTILIZER INDUSTRY

Wastewater Management.-

1. Efforts will be made for conservation of water, particularly with a target to have consumption less than 8, 12 and 15 m^3/tonne of urea produced for plant based on gas, naphtha and fuel oil, respectively. In case of plants using Naptha and Gas both as feed stocks, water consumption target of less than 10 m^3/tonne will be achieved. An action plan for this will be submitted by June 2003 and targets will be achieved by March 2004.
2. Use of arsenic for CO_2 absorption in ammonia plants and chromate based chemicals for cooling systems, which is still continuing in some industries, will be phased out and replaced with non-arsenic and non-chromate systems by December 2003. In this regard, action plan will be submitted by June 2003.
3. Adequate treatment for removal of oil, chromium (till non-chromate based cooling system is in place) and fluoride will be provided to meet the prescribed standards at

the source (end of respective process unit) itself. Action plan will be firmed up by June 2003 for compliance by March 2004.

4. Proper and complete nitrification and de-nitrification will be ensured, wherever such process is used for effluent treatment, by September 2003.
5. Ground water monitoring around the storage facilities and beyond the factory premises will be carried out at regular intervals particularly for pH, fluoride. CPCB will finalize the guidelines for groundwater monitoring by December 2003.
6. No effluent arising from process plants and associated facilities will be discharged to the storm water drain. The quality of storm water will be regularly monitored by all the industries.
7. The industries, where waste water/effluent flows through the storm water drains even during the dry season will install continuous systems for monitoring the storm water quality for pH, ammonia and fluoride. If required, storm water will be routed through effluent treatment plant before discharging. An action plan will be submitted by June 2003 and necessary action will be taken by June 2004.

Air Pollution Management.-

1. All the upcoming urea plants will have urea prilling towers based on natural draft so as to minimize urea dust emissions.
2. The existing urea plants, particularly, the plants having forced draft prilling towers, will install appropriate systems (e.g. scrubber, etc.) for achieving existing norms of urea dust emissions. In this regard, industries will submit action plan by June 2003 and completion of necessary actions by June 2004.
3. The sulphuric acid plants having SCSA system will switch over to DCDA system by March 2004 to meet the emission standard for SO_2 as 2 kg/tonne of H_2SO_4 produced. An action plan for this will be submitted by June 2003.
4. Sulphuric acid plants having DCDA system will improve the conversion and absorption efficiencies of the system as well as scrubbers to achieve SO_2 emissions of 2 kg/tonne of acid produced in case of plants having capacity above 300 tpd and 2.5 kg/tonne in case of plants having capacity upto 300 tpd. An action plan will be submitted by June 2003 and emission levels will be complied with by September 2004.
5. Stack height for sulphuric acid plants will be provided as per the guidelines and on the basis of normal plant operations (and not when the scrubbers are in use) by June 2003. The scrubbed gases are to be letout at the same height of the stock.
6. An action plan for providing proper dust control systems at rock phosphate grinding unit in phosphoric acid plants/single super phosphate plants, so as to achieve particulate emission levels of 150 mg/Nm^3 will be submitted by September 2003 and complied with by March 2004.
7. Particulate as well as gaseous fluoride will be monitored and adequate control systems will be installed by June 2004 to achieve the norms on total fluoride emissions (25mg/Nm^3).
8. Continuous SO_2 emission monitoring systems will be installed in sulphuric acid plants (having capacity 200 tpd and above) by March 2004. Action plan for this will be submitted by June 2003.
9. Regular monitoring of ambient air quality with regard to SO_2, NOx, PM, SO_3, fluoride and acid mist will be carried out.

Solid Waste Management.-

1. Gypsum will be effectively managed by providing proper lining, dykes with approach roads and monitoring of groundwater quality around storage facilities. Accumulated gypsum will be properly capped. In this regard, action plan will be submitted by June 2003 and for compliance by December 2003.
2. An action plan for proper handling, storage and disposal of spent catalyst having toxic metals will be submitted by June 2003 and implemented by September 2003. The industry will also explore recovery/buy-back of spent catalyst by September 2003.
3. Carbon slurry, sulphur muck and chalk will be properly managed and disposed of in properly designed landfill either within premises or in common facility. Action plan on this will be submitted by June 2003 and implemented by March 2004.
4. Existing stock of chromium and arsenic bearing sludge will be properly disposed by December 2003. Industries will also explore recovery of chromium from the sludge. CPCB will provide guidelines for proper disposal of the sludge.

7.2.8 INTEGRATED IRON & STEEL INDUSTRY

Coke Oven Plants.-

- To meet the parameters PLD (% leaking doors), PLL (% leaking lids), PLO (% leaking off take), of the notified standards under EPA within three years (by December 2005). Industry will submit time bound action plan and PERT Chart along with the Bank Guarantee for the implementation of the same.
- To rebuild at least 40% of the coke oven batteries* in next 10 years (by December 2012).

Steel Melting Shop.-

Fugitive emissions - To reduce 30% by March 2004 and 100% by March 2008 (including installation of secondary de-dusting facilities).

Blast Furnace

- Direct inject of reducing agents —— by June 2013.

Solid Waste / Hazardous Waste Management

Utilization of Steel Melting Shop (SMS) / Blast Furnace (BF) Slag as per the following schedule :

- By 2004 - 70%,
- By 2006 – 80% and
- By 2007 – 100%.

Hazardous Wastes

- Charge of tar sludge / ETP sludge to Coke Oven by June 2003.
- Inventorization of the Hazardous Waste as per Hazardous Waste (M&H) Rules, 1989 as amended in 2000 and implementation of the Rules by Dec. 2003.

(tar sludge, acid sludge, waste lubricating oil and type fuel falls in the category of Hazardous Waste)

Water Conservation / Water Pollution

- To reduce specific water consumption to 5 m^3/t for long products and 8 m^3/t for flat products by December 2005.

- To operate the CO-BP effluent treatment plant efficiently to achieve the notified effluent discharge standards. - by July 2003
- Installation of Continuous stack monitoring system & its calibration in major stacks and setting up of the online ambient air quality monitoring stations by June 2005.
- To operate the existing pollution control equipment efficiently and to keep proper record of run hours, failure time and efficiency with immediate effect. Compliance report in this regard be submitted to CPCB / SPCB every three months.
- To implement the recommendations of Life Cycle Assessment (LCA) study sponsored by MoEF by December 2003.

The industry will initiate the steps to adopt the following clean technologies/measures to improve the performance of industry towards production, energy and environment.

- Energy recovery of top Blast Furnace (BF) gas.
- Use of Tar-free runner linings.
- De-dusting of Cast House at tap holes, runners, skimmers ladle and charging points.
- Suppression of fugitive emissions using nitrogen gas or other inert gas.
- To study the possibility of slag and fly ash transportation back to the abandoned mines, to fill up the cavities through empty railway wagons while they return back to the mines and its implementation.
- Processing of the waste containing flux & ferrous wastes through waste recycling plant.
- To implement rainwater harvesting.
- Reduction of Green House Gases by:

  * Reduction in power consumption

  * Use of by-products gases for power generation

  * Promotion of Energy Optimisation Technology including energy audit
- To set targets for Resource Conservation such as Raw material, energy and water consumption to match International Standards.
- Up-gradation in the monitoring and analysis facilities for air and water pollutants. Also to impart elaborate training to the manpower so that realistic data is obtained in the environmental monitoring laboratories.
- To Improve overall house keeping.

Sponge Iron Plants

Inventorisation of sponge iron plants to be completed by SPCBs/CPCB by June 2003 and units will be asked to install proper air pollution control equipment by December 2003 to control primary and secondary emissions.

* Asper rebuilding schedule submitted to CPCB/MoEF.

7.2.9 OIL REFINERIES

Air Pollution Management.-

1. All the refineries located in the critically polluted areas, identified by CPCB, will submit an action plan (within six months) for phase wise reduction of SO_2 emission from the present level.
2. Future refineries will have Sulphur Recovery Unit (SRU) with minimum 99% efficiency.
3. To enhance the efficiency of SRUs in the existing refineries, an expert committee will be constituted to look into various aspects and suggest a road map within six months.
4. With regard to NOx emission, the new refineries/process units will install low NOx burners. For retrofitting of low NOx burners in existing units, the expert committee will suggest the strategies and action plan within six months including NOx standard.
5. The flare losses will be minimized and monitored regularly.
6. Refineries will install continuous emission monitoring systems for SOx and NOx in major stacks with proper calibration facilities. Action plan for this will be submitted within six months.
7. Refineries will also monitor total HC and Benzene in the premises (particularly at loading/un-loading operations and ETP). The status and action plan will be submitted within six months. The expert committee will also suggest an action plan, within six months, for control and monitoring of hydrocarbon loss & VOC emissions, leak detection and repair (LDAR) programme and vapour recovery systems (for loading & unloading operations within refineries only).

Wastewater Management.-

1. Refineries will prepare action plan for conservation of water resources and maximizing reuse/ recycling of treated effluent within six months. The treated effluent discharge quantity (excluding once through cooling water) will be limited to 0.4 m^3/ tonne (for 90% of time) except for the monsoon season.
2. Oil spill response facilities at coastal refineries will be in position within two years. To facilitate this, MoEF will coordinate with Coast Guards, Port Trust and other departments.

Solid Waste Management.-

1. Refineries will explore new technologies for reduction in the generation of oily sludge. Strategy and action plan for liquidation of existing sludge will be submitted within six months.
2. The petroleum coke having high sulphur content will only be sold to/ reused by organized industries (having consent from SPCBs), which have systems to control SO_2 emissions. This will be ensured by June 2003.

7.2.10 PESTICIDES INDUSTRY

Segregation of waste streams.-

Waste streams should be segregated into high COD waste, toxic waste, low COD waste, inorganic waste etc. for the purpose of providing appropriate treatment –Implementation by June 2003 and action plan to be submitted to SPCB, immediately.

Detoxification and treatment of high COD waste streams.-

Streams should be detoxified and treated in ETP or thermally destroyed in incinerator, as per CPCB guidelines. The waste streams should be treated suitably before taking to evaporation ponds – Implementation by June 2004 and action plan to be submitted to SPCB by June 2003.

Improvement in solvent recovery.-

1. Solvent recovery should be improved and attempts to be made to achieve atleast 90% recovery wherever possible - Implementation by Dec. 2003 and action plan to be submitted to SPCB by June 2003.

2. Rest of the solvents which can not be recovered shall be incinerated -Implementation by Dec. 2004 and action plan to be submitted to SPCB by June 2003.

By-product recovery and utilization.-

As by-products are not being recovered fully, industry will make effort to recover by-product as far as possible - Implementation by March 2004 and action plan to be submitted to SPCB by June 2003.

Hazardous air pollutant control.-

- For air pollution control from processes, scrubber efficiency will be improved and maintained as per the best practicable technology for control of HCl, Cl_2, Methyl Chloride, Phosphorus Pentoxide, Ammonia, H_2S and volatile organic carbons (VOCs) - Implementation by December 2003 and action plan to be submitted to SPCB by June 2003.

- An incinerator will be installed, where necessary Implementation by December 2004 and action plan to be submitted to SPCB by June 2003.

Control of fugitive emissions / VOCs.-

For control of fugitive emissions (particularly for hazardous air pollutants), the industries will adopt standard engineering practices. System of leak detection and repair (LDAR) programme especially for solvents, should be developed by industries - Implementation by March 2004 and action plan to be submitted to SPCB by June 2003.

Up-gradation of incinerators.-

Incinerators will be upgraded to meet CPCB norms for hazardous waste incinerators. This is necessary for Halogenated compound and POPs – Implementation target will be decided on the basis of action plan submitted by individual industries by June 2003.

Replacement of Bio Assay test by Toxicity Factor.-

The present bio-assay test will be replaced by Toxicity Factor test method developed by CPCB. Toxicity factor of four (TF-4) will be achieved by December 2003 and industries will improve their ystem to achieve TF-2 by July, 2006. TF test method will be implemented by SPCBs/ CPCB / MoEF -Submission of action plan by June 2003. The Central Pollution Control Board will organize work-shops on "Toxicity Factor" for industry.

Minimum scale of production to afford cost of pollution load.-

To be decided, as industries' view point is that this can not be done as few products are costly and made in small volume. The matter will be studied in detail by MoEF/ CPCB.

Non-complying Units.-(as identified by SPCB) should meet the notified standards by December 2003 – Bank guarantee to be submitted to SPCB by non-complying units by June 2003. The submissions from pesticides industry regarding speedy clearance and others will be considered by MoEF/CPCB for examination.

7.2.11 PETROCHEMICALS

Adoption of state-of-art technology.-

State of Art technology will be adopted for both process technology as well as sound engineering practices required for control of emission, at the stage of design itself in case of new plants.

Management of storm water.-

For the storm water generated from process area and tank farm area during initial hours of rain, an arrangement will be made for collection and oil separation including further treatment as required. Such arrangement will include provision for buffer tank (holding tank) and monitoring of effluent quality. This will be accomplished by June 2003.

Effective detoxification and wastewater treatment scheme.-

In order to control high COD and persistent organic pollutants including toxic constituents, the industry will select appropriate unit operations for pre-treatment of effluent within inside battery limit (ISBL) before sending to the biological treatment systems for better functioning of ETPs. Action plan for the same will be submitted within 6 months and implemented within one year (March, 2004).

Control of emission from combustion.-

The industry will submit an action plan within six months for improving thermal efficiency and control of NOx.

Proper functioning of point source emission control systems.-

The industry will make efforts for proper operation of pollution control systems (mostly scrubbers) and attainment of desired efficiency within six months. This will include backup of power supply to the control equipment and arrangement for frequent sampling and analysis of all critical pollutants in the tail gases.

Leak detection and repair (ldar) programme.-

As a good operating practices, the industry will adopt periodically leak detection and repair (LDAR) programme to check fugitive emissions within six months. The frequency of the programme will be proportionate to the risk potential of carrying fluid. Based on leak detection as per LDAR programme, action will be taken to eliminate fugitive emissions. This will be a continuous activity.

Handling of halogenated organics.-

The industry will submit an action plan within 6 months to ensure that no halogenated organics is sent to the flares in order to avoid formation of persistent organic pollutants. All HAPs and halongenated organics will be routed to the incineration system having end-on pollution control facility.

Control of fugitive emissions of carcinogenic compounds.-

Fugitive emissions of carcinogenic compounds (e.g. Benzene) will be controlled by closed vapor collection and recovery system. Measures will be taken to monitor health of the workers.

Management of solid waste.-

Proper facilities will be provided for handling and storage of hazardous waste with manifest system in case transported to other places. For incinerable waste, properly designed incinerator will be installed within the premises or as a common facility. The non-incinerable hazardous waste should be disposed of in a secure-landfill.

Proper operation of incinerator.-

Industry will check the design and will adopt sound engineering practices for proper operation of incinerators. Continuous monitoring will be done for operational parameters and specific parameters in tail gas to ensure the efficient functioning. This will be implemented within 3 months.

Optimising the inventory of hazardous chemicals.-

Efforts will be made to optimise the inventory, particularly of hazardous chemicals. Such information will be made available to the Regulatory Agencies (SPCBs, Inspector of Factory & District Collector).

Self-regulation by industry through regular monitoring and environmental auditing.-

Industry will go for self-assessment and regulation by conducting environmental auditing regularly, besides having regular monitoring of pollutants in air emission, liquid effluent and receiving environment.

Organizational restructuring and accreditation of environmental manager of industry.-

For self-evaluation, organizational restructuring will be done and the environmental manager of the industry will be accredited to bring professionalism in environmental management.

7.2.12 PHARMACEUTICALS

Segregation of waste streams.-

Waste streams should be segregated into high COD waste, toxic waste, low COD waste, inorganic waste etc. for the purpose of providing appropriate treatment. Implementation by December 31, 2003 and action plan to be submitted to SPCB by June 30, 2003.

Detoxification and treatment of high COD waste streams.-

High COD streams should be detoxified and treated in ETP or thermally destroyed in incinerator- Implementation by March 2004 and action plan to be submitted to SPCB by June 2003.

Management of solid waste.-

Proper facilities should be provided for handling and storage of hazardous waste. For final disposal of hazardous waste, recycling and reuse should be given priority, either within the

premises or outside with proper manifest system. In case of incinerable waste, properly designed incinerator should be installed within the premises or outside as a common facility. The non-incinerable hazardous waste should be disposed of in properly designed secure-landfill either within the industry's premises or in a common facility – Implementation by March 2004 and action plan to be submitted to SPCB by June 2003.

Minimum scale of production to afford cost of pollution control.-

For new industries which are not connected with CETP & TSDF and which do not have the economics to install treatment facilities may not be considered for granting consent to establishment. Industry association shall submit proposal to SPCB / CPCB - implementation by December 31, 2003 and action plan to be submitted to SPCB by June 30, 2003. .

Long term strategies for reduction in waste.-

Consent for establishment and consent for operation under the Water Act will be based on pollution load and concentration of pollutants. Each industry will submit pollution load, concentration of final discharge alongwith water balance to SPCB/CPCB for formulation of strategy - action plan to be submitted to SPCB by June 30, 2003..

Control of air pollution.-

Industry will take up on priority, the control of hazardous air pollutants (such as benzene, carbon tetrachloride, 1-4 dioxane, methanol, toluene, methyl chloride etc.) and odorous compounds (mercapatan & hydrogen sulphide) - Implementation by Dec. 2004 and action plan to be submitted to SPCB by June 2003.

Self-regulation by Industry though regular monitoring and environmental auditing.-

Industries on their own will carry out monitoring of environmental parameters, audit it at regular intervals and submit the same to SPCB - Implementation by June 2003.

Comment of BDMA - There shall be a policy for accreditating the auditors and the policy guidelines may be issued by MoEF. .

Organisational restructuring and accreditation of Environmental Manager of Industry.-

- Environment management cell will be created for each industry reporting to CEO directly - Implementation by June 2003.
- There should be a certification system for the environmental managers at individual level and common facility level. BDMA may evolve the programme alongwith SPCB/CPCB - Implementation by March 31, 2004 and action plan to be submitted to SPCB by July 2003.

Optimising the inventory of hazardous chemicals.-

The information shall be submitted to SPCB regularly alongwith rational - action plan to be submitted to SPCB by May 31, 2003.

Proper operation of incinerator.-

Industry will check the design and will adopt sound engineering practices for proper operation of incinerators. Continuous monitoring will be done for operational parameters and specific parameters in tail gas to ensure the efficient functioning. This will be implemented within 3 months.

Optimising the inventory of hazardous chemicals.-

Efforts will be made to optimise the inventory, particularly of hazardous chemicals. Such information will be made available to the Regulatory Agencies (SPCBs, Inspector of Factory & District Collector).

Self-regulation by industry through regular monitoring and environmental auditing.-

Industry will go for self-assessment and regulation by conducting environmental auditing regularly, besides having regular monitoring of pollutants in air emission, liquid effluent and receiving environment.

Organizational restructuring and accreditation of environmental manager of industry.-

For self-evaluation, organizational restructuring will be done and the environmental manager of the industry will be accredited to bring professionalism in environmental management.

7.2.13 Pulp & Paper Industry.-

Large Pulp and Paper	Implementation Schedule
Discharge of AOX kg/tonne of paper	AOX 1.5 kg/tonne of paper within 2 years AOX 1.0 kg / tonne of paper in 5 years
Installation of lime kiln	Within 4 years
Wastewater discharge cum / tonne of paper	Less than 140 cum tonne of paper within 2 years Less than 120 cum / tonne in 4years for units installed before 1992 Less than 100 m3 / tonne of paper per units installed after 1992.
Odour control by burning the reduced sulfur emissions in the boiler/lime-kiln	Installation of odour control system within 4 years.
Utilization of treated effluent for irrigation	Utilization of treated effluent for irrigation wherever possible

Colour removal from the effluent	Indian Paper Manufacturers Association to take up project with Central Pulp & Paper Research Institute
Small Pulp and Paper	
Compliance of standard of BOD, recovery COD & AOx	Recovery of chemicals by installation of Chemical plant or utilization of black liquor with no discharge from pulp mill within 3 years **OR** Shift to waste paper
Upgradation of ETPs so as to meet discharge standards	ETPs to be upgraded within 1 year so as to meet discharge standards.
Waste water discharge/ tonne of paper	Less than 150 cum/tonne of paper within 3 years
Utilization of treated effluent for irrigation	Utilization of treated effluent for irrigation wherever possible
Colour removal from the effluent	Indian Agro and Recycled Paper Manufacturers Association to take up project with CPPRI.

Note: Non-complying units not meeting notified standards under Environment (Protection) Act, 1986 will submit action plan with PERT Chart along with bank guarantee to SPCBs by June 30, 2003.

7.2.14 SUGAR INDUSTRY

Waste Water Management.-

- Operation of ETP shall be started atleast one month before starting of cane crushing to achieve desired MLSS so as to meet the prescribed standards from day one of the operation of mill.
- Reduce wastewater generation to 100 litres per tonne of cane crushed by April 2004.
- To achieve zero discharge in inland surface water bodies by December 2004.
- To provide 15 days storage capacity for treated effluent to take care of no demand for irrigation by April 2004.

Emission Control.-

To install ESP/bag filter/high efficiency scrubber to comply with standards for particulate matter emission to <150 mg/Nm^3 by April 2004.

7.2.15 TANNERY CHROME RECOVERY

1. All the chrome tanning units in the country will have the Chrome Recovery Plant either on individual basis or on collective basis in the form of Common Chrome Recovery Plant and use the recovered chrome in the tanning process by December 2005.
2. Common Chrome Recovery Plant is to be installed and commissioned at Kanpur by December 2004 for which the Feasibility Report has already been prepared. All the chrome tanning units will make their financial contribution to the extent of 10% by June 2003.
3. Recovered Chromium is to be utilized in tanning process by December 2004.

Waste Minimisation Measures.-

1. Waste minimisation circles will be formed in all the clusters of tanneries in the country to implement waste minimisation measures and for adoption of clean technologies by March 2004.
2. Waste minimisation measures as identified by the Task Force to be implemented in all the tanneries by December 2005.

Reduction of Water Consumption in Tannery Units.-

1. All the tanneries will install water meters and flow meters to measure actual consumption and waste water discharge by December 2003.
2. Water consumption rates will be brought down to 28 m^3/tonne of hides by taking water conservation measures by December 2003.

Compliance of Standards.-

All CETPs and ETPs will take the following measures:

1. Deployment of qualified and well trained staff for O & M of the ETPs/CETPs by December 2003.
2. Installation of automatic monitoring instruments by CETPs/large tanneries by December 2003.
3. Separate Energy meters for ETPs / CETPs by December 2003.
4. Replacement of open anaerobic lagoons with cleaner technology options will be implemented. By : December 2005.
5. Implementation of guidelines developed by CPCB for Health & safety of workers employed in the industry / ETP/ CETP. By : December 2003.
6. All large tannery units (processing more than 5 tonnes/day of hides/skins) will undertake Environmental Auditing on annual basis. By : June 2004.
7. Modification / up-gradation of the CETPs/ETPs wherever necessary will be taken up by tannery units and CETP management. By : December 2005

Management of Total Dissolve Solids (TDS).-

For TDS Management following methods will be adopted:

1. Manual / mechanical desalting. By : December 2003.
2. Use of cleaner technology for less use of salt. By : December 2005.
3. High Rate Transpiration system for effluent treatment will be adopted wherever feasible. By : December 2004.
4. Treated wastewater will be mixed with the sewage wherever feasible and further treated and the treated combined effluent will be used on land for irrigation. By : December 2005.

Solid Waste Management.-

For solid waste management, the following methods will be adopted:

1. Utilization of Process sludge for by-product recovery - By December 2004.
2. Resource Recovery from process sludge and ETP sludge in the form of Biogas - By December 2004.
3. Safe disposal of hazardous sludge and non-hazardous solid wastes - By December 2005.

Salt from Solar Evaporation.-

The following methods will be adopted depending on the site specific conditions:

- Reuse of recovered salt. By : December 2005.
- Safe land disposal or Sea disposal wherever required.
- Use of Boron bearing compounds will be dispensed with. By : December 2003.

- Ground water quality monitoring to be strengthened wherever the treated effluents are applied on land for irrigation. By : December 2004.
- The implementation of recommendations of the Task Force constituted by the Ministry of Environment & Forests, Govt. of India will commenced by June 2003.

Note: Non complying units not meeting notified standards under Environment (Protection), 1986 will submit action plan with PERT Chart along with Bank Guarantee to SPCB by June 30, 2003.

7.2.16 THERMAL POWER PLANTS

- Implementation of Environmental Standards (emission & effluent) in non-compliant* Power Plants (31 & 27) - Submission of action plan : June 30, 2003 - Placement of order for pollution control equipment : September, 2003 - Installation & commission : December 31, 2005
- For existing thermal power plants, a feasibility study shall be carried out by Central Electricity Authority (CEA) to examine possibility to reduce the particulate matter emissions to 100 mg/Nm^3. The studies shall also suggest the road map to meet 100 mg/Nm^3 wherever found feasible. CEA shall submit the report by March 2004.
- New / expansion power projects to be accorded environmental clearance on or after 1.4.2003 shall meet the limit of 100 mg/Nm^3 for particulate matter.
- Development of SO_2 & NOx emission standards for coal based plants by Dec. 2003. - New / expansion power projects shall meet the limit of SO_2 & NOx w.e.f 1.1.2005 – Existing power plants shall meet the limit of SO_2 & NOx w.e.f. 1.1.2006
- Install/activate opacity meters/continuous monitoring systems in all the units by December 31, 2004 with proper calibration system.
- Development of guidelines / standards for mercury and other toxic heavy metals emissions by December 2003.
- Review of stack height requirement and guidelines for power plants based on micro meteorological data by June 2003.
- Implementation of use of beneficiated coal as per GOI Notification: Power plants will sign fuel supply agreement (FSA) to meet the requirement as per the matrix prepared by CEA for compliance of the notification as short term measure.

Options/mechanism for setting up of coal washeries as a long term measure

- Coal India will set up its own washery
- State Electricity Board to set up its own washery
- Coal India to ask private entrepreneurs to set up washeries for CIL and taking washing charges
- SEBs to select a private entrepreneur to set up a washery near pit-head installation of coal beneficiation plant

2. Power plants will indicate their requirement of abandoned coal mines for ash disposal & Coal India / MOC shall provide the list of abandoned mines by June 2003 to CEA
3. Power plants will provide dry ash to the users outside the premises or uninterrupted access to the users within six months.
4. Power Plants should provide dry flyash free of cost to the users.
5. State P.W.Ds / construction & development agencies shall also adhere to the specifications / Schedules of CPWD for ash / ash based products utilisation. MoEF will take up the matter with State Governments.

6. (i) New plants to be accorded environmental clearance on or after 1.04.2003 shall adopt dry flyash extraction or dry disposal system or Medium (35-40%) ash concentration slurry disposal system or Lean phase with hundred percent ash water re-circulation system depending upon site specific environmental situation.

   (ii) Existing plants shall adopt any of the systems mentioned in 13 (i) by December 2004.

7. Flyash Mission shall prepare guidelines/manuals for flyash utilization by March 2004.

8. New plants shall promote adoption of clean coal and clean power generation technologies

* Units will submit bank guarantee to respective SPCB.

7.2.17 ZINC INDUSTRY

1. Meeting SO_2 emission limit (2 kg / tonne of H_2SO_4 produced), 50 mg / Nm^3 of acid mist by Dec 2006. Action plan to be submitted by July 2003.
2. SO_2 Emissions monitoring - Installation / Proper operation, maintenance and calibration of continuous SO_2 monitoring system by 30th September 2003
3. Solid and Hazardous Waste disposal: Construction of secured landfill for disposal of hazardous waste such as Jerosite cake, ETP cake and spent catalyst as per CPCB guidelines by 30th June, 2003.
4. Wastewater treatment and disposal: To achieve Zero discharge through 100% recycle/reuse of treated wastewater by 31st December, 2004.
5. House Keeping: To reduce the generation of fugitive dust from vehicle movement and improve overall house keeping - by 31st December, 2003
6. Green Belt: To develop canopy based green belt around the periphery of plant and township as per CPCB guidelines

7.3. GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT

(Source : MoEF Notification dtd 14.9.2006)

Sl. No.	EIA Structure	Contents
1.	Introduction	• Purpose of the report • Identification of project & project proponent • Brief description of nature, size, location of the project and its importance to the country, region • Scope of the study-details of regulatory scoping carried out.
2.	Project Description	Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects. Details should be provided to give clear picture of the following: • Type of Project • Need for the project • Location (maps showing general location, specific location, project boundary & project site layout) • Size or magnitude of operation (incl. Associated activities required by or for the project • Proposed schedule for approval and implementation • Technology and process description • Project description, including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose • Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements • Assessment of new & untested technology for the risk of technological failure
3.	Description of the Environment	• Study area, period, components & methodology • Establishment of baseline for valued environmental components, as identified in the scope • Base maps of all environmental components
4.	Anticipated Environmental Impacts	• Details of investigated environmental impacts due to & Mitigation Measures project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project • Measures for minimizing and /or offsetting adverse impacts identified

		• Irreversible and irretrievable commitments of environmental components. • Assessment of significance of impacts (Criteria for determining significance, Assigning significance) • Mitigation measures
5.	Analysis of Alternatives (Technology & Site)	• In case, the scoping exercise results in need for alternatives: • Description of each alternative • Summery of adverse impacts of each alternative • Mitigation measures proposed for each alternative and • Selection of alternative
6.	Environmental Monitoring Program	• Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)
7.	Additional Studies	• Public Consultation • Risk assessment • Social Impact Assessment. R&R Action Plans
8.	Project Benefits	• Improvements in the physical infrastructure • Improvements in the social infrastructure • Employment potential-skilled; semi-skilled and unskilled • Other tangible benefits
9.	Environmental Cost Benefit Analysis	If recommended at scoping stage
10.	EMP	• Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA
11.	Summary & Conclusion (This will constitute the summary of the EIA Report)	• Overall justification for implementation of the project. • Explanation of how, adverse effects have been mitigated.
12.	Disclosure of Consultants engaged	• The names of the Consultants engaged with their brief resume and nature of Consultancy rendered

CONTENTS OF SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

The Summary EIA shall be a summary of the full EIA Report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following Chapters of the full EIA Report :-

1. Project Description
2. Description of the Environment
3. Anticipated Environmental impacts and mitigation measures
4. Environmental Monitoring Programme
5. Additional Studies
6. Project Benefits
7. Environment Management Plan

7.4 BEST PRACTICES FOR SELECTED INDUSTRIES

7.4.1 SUGAR INDUSTRY

Water Management & Waste Water Recycling in Sugar Industry:

Preventive measure & practices

The present status of pollution in sugar industry indicates that this problem is more of preventive nature rather than cure. The volume & pollution load of any sugar factory depends on several factors like process of sugar manufacture, maintenance of plant & equipment, working habits of the workers, availability of water, mode of effluent disposal etc. We have to pay our full attention to the following measures:

a) Avoid

Such processes, equipment, practices etc. which result more pollution and substitute them with those which produce less. The typical examples are elimination of carbonation process of sugar manufacture in favour of double sulphitation, replacement of filter presses with rotary vacuum filters and repair/replacement of leaking pipeline, pumps, valves, equipment etc.

b) Reduce

Or rather eliminate all those practices which cause pollution. The practices suggested under 'DO's and DONT's (Annexures I and II) should be strictly followed in order to keep the factory clean. It has to be well understood that the habits of the workers have got to be changed gradually in order to prevent/reduce the pollution. It needs a personal interest & supervisory control of the top management,

c) Segregate

All the unpolluted & less polluted effluents emanating from spray pond, cooling/condenser water, boiler blow down etc., from mixing with the more polluted effluents generated in the mill house, boiling & curing house, press house etc. (Table 1). This will greatly reduce the volume of more polluted effluent requiring treatment. At the same time, the recycling of unpolluted effluent as process water will reduce the requirement of fresh make up water. It will need an integrated scheme of water management & effluent recycle in the factory.

It will greatly help in reducing the installation/operational cost of ETP in addition to saving on process water expenses.

Water management in sugar industry.-

The sugarcane brings with it about 70% water, out of which only about 9 to 10% finally finds its way as effluent. In addition, water is necessarily used for various essential activities like regeneration of DM plant, heat exchanger cleaning, cooling of various machines and for house keeping. A schematic diagram in Annexure III shows the water entering sugar factory along with cane and the best way of utilizing it as process water. A perusal of this balance reveals that a major portion of the water from cane goes along with the by-products like bagasse, molasses & filter cake etc. The remaining water after utilization in the process escape as evaporation loss during spray.

The details of apportionment of water to by-productions, process etc, are given in Table (1) The effluent necessarily generated at different sections in the sugar manufacturing process is shown in Table (2).

Annexure - I

Steps to Reduce the Volume & Extent of Pollution in A Sugar Factory

DOs

1. Check all glands, flanges, pumps etc. for leakage & effect immediate repairs.
2. Sweep all the drains & wash them free from all deposits once everyday.
3. Sweep all the floors at different stations once every day by sprinkling water and bagasse drying. There should be no floor washings and bagasse used for floor sweeping should preferably by sent to cane carrier or burnt in the boilers. ADOPT DRY CLEANING WITH DRY BAGASSE INSTEAD OF WATER WASHING, AS FAR AS POSSIBLE.
4. Isolate the molasses, magma & juice pumps by a 4" to 6" parapet wall to arrest any leakage, to be lifted by bagasse drying.
5. Fully segregate the polluted drains from drains carrying condenser & cooling water. The segregated drain containing all factory washings etc. should be finally taken into a 4' x 4' x 3' deep pit and then let out for treatment. A damper may be put in drain outgoing from the pit to arrest any flow and duly locked, to be opened, when needed, under permission of the Chief Chemist.
6. Provide a grease trap to arrest oil & grease in the mill house drain.
7. Provide a grit chamber to arrest pressmud from going into the drain. The pressmud washings should be neutralized with slaked lime waste water before allowing it to the polluted drain.
8. Surround the molasses storage tank by one ft. wall with three ft. puccaspace all around to prevent any molasses overflow to leak into the drains.
9. The drain waters from centrifugals & press house could also be collected & after proper examination, may be pumped on to the mills, otherwise drained out. These washings will be much reduced by dry cleaning with bagasse.

Annexure - II

Steps to Reduce the Volume & Extent of Pollution in a Sugar Factory

DON'Ts

1. Do not allow juice, syrup or sugar or molasses to trickle from pipes, valves, flanges as far as possible.
2. Do not allow any overflows to mix with the effluents.
3. Do not allow press house spills or washings to mix with the effluents.
4. Do not allow oil & grease to leak on to the floor or into the drains or mix with the effluents.
5. Do not allow hose pipes & water taps to remain open unless required.
6. Do not allow centrifugal house washings & molasses storage washings to mix with the effluents.
7. Do not allow any effluent in any drain in or outside the factory to stagnate or leave sediments or deposits.
8. Do not allow lime grit, lime water or sewage waste liquid or night soil to be wasted. Direct them for neutralization or to the treatment plant.
9. Do not allow polluted effluents to mix with the clean wash water or with non-polluted effluent.
10. Do not allow any entrainment in spray pond water.

Annexure - III Water Balance (Ltr./h) Crush Rate 1 tch

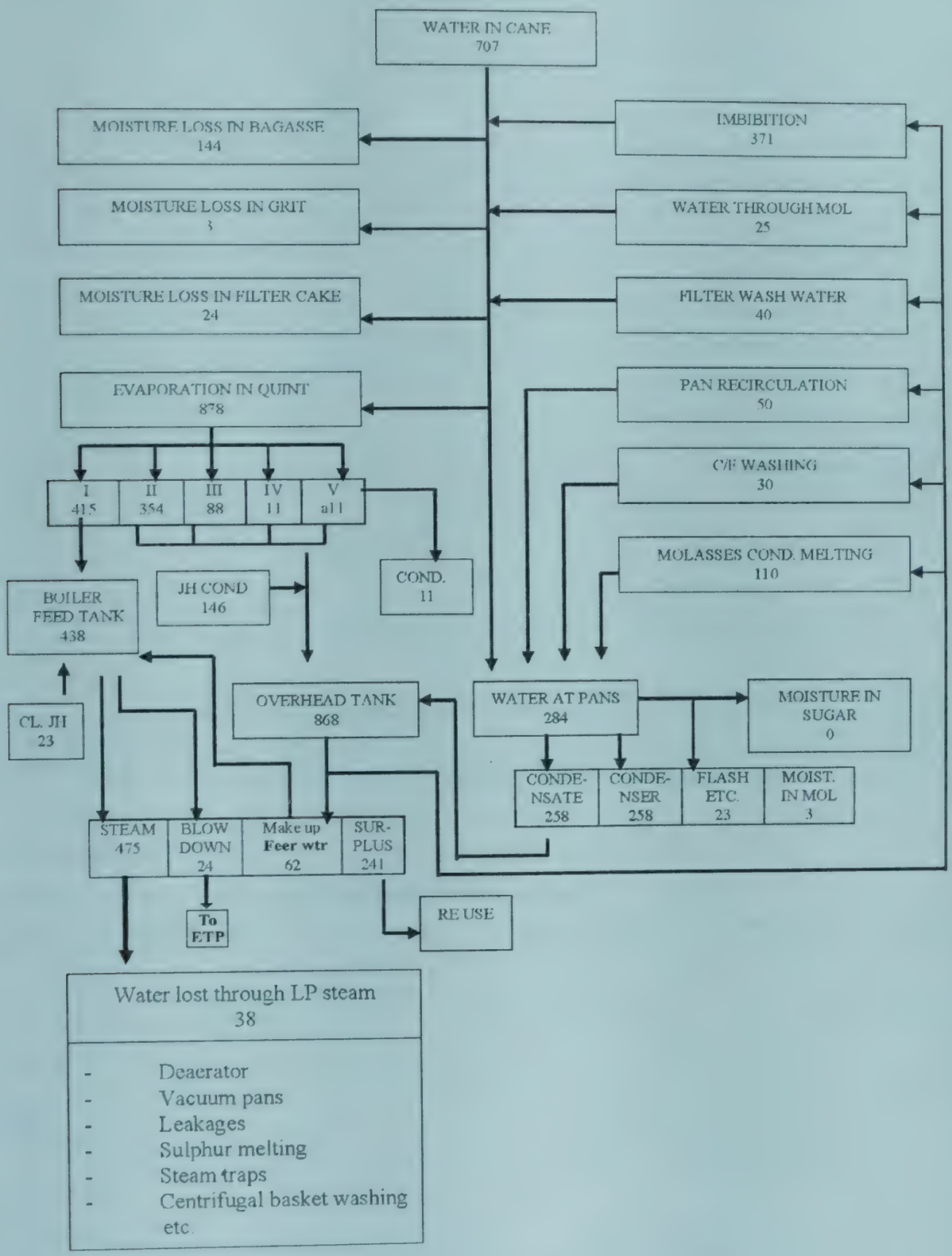


Table - 1 : Utilization of Water from Cane

Sl. No.	Particulars	Moisture loss in lit/tonne of cane	Litres/ton of cane
1.0	Total water from cane		707
2.0	Water lost :		
	2.1 Through by-products / waste products -		
	(a) Bagasse	144	
	(b) Lime grit	3	
	(c) Filter cake	24	
	(d) Final molasses	3	174
	2.2 Through venting :		
	(a) Low pressure stream / vapours	38	
	(b) Condensate flash	23	61
3.0	Net water available from cane	(1.0 – 2.0)	472
4.0	Make up water at boilers		62
	Total water input	**(3.0 + 4.0)**	**534**
5.0*	Water lost during crystallization :		
	(a) As condensate	241	
	(b) As vapours from vacuum pans and evaporators	269	510
6.0	Boiler blow down	24	
	Total	**(5.0 + 6.0)**	**534**

* Total condensate and vapours (after condensation) go to the spray pond.

Table - 2 : Section-wise Effluent Generation

Sl. No.	Particulars	Litres/ton of cane
1.0	Boiler House –	
	1.1 D.M. Plant Regeneration	18-24
2.0	Equipment Cooling –	
	2.1 Gland cooling of pumps	53-80
	2.2 SO2 gas cooling	12-16
3.0	Lab. and Lime House	4-5
4.0	Personnel needs, drinking, toilets, etc.	20-27
5.0	House keeping, heat exchanger, drainage & cleaning and miscellaneous including external bearing cooling etc.	40-80
6.0	Domestic waste water	18-20
	Total (Sl. 1.0 to 6.0)	**165-252**

7.4.2 SPENT WASH MANAGEMENT IN DISTILLERIES

Distillery wastes in the form of 'SPENTWASH' are amongst the worst pollutants produced by industries, both in magnitude and strength. Treatment and safe disposal of these effluents has been a challenge before the scientists and administrators for a long time. It has also been a serious concern for the distillery industry. The strict imposition of water pollution control regulations has compelled the distilleries to adopt methods for treatment of spentwash.

Spent wash

In the production of alcohol from molasses, 3 to 10 kgs of molasses are used for producing 1 liter of alcohol. Each litre of alcohol produced in India generates about 15 liters of spentwash in batch process and 8 to 10 liters of spentwash in continuous fermentation process. The distillery spentwash is hot, highly acidic and coloured and also contains high percentage of dissolved organic and inorganic matter. Indian spentwash also contains large percentage of potassium in comparison to spentwash from other countries.

Yeast Sludge

Yeast sludge containing about 30 per cent solids settles down in the fermentation vats and constitutes another major source of waste. Yeast sludge and other wash waters are discharged along with the dealcoholized spentwash.

Condenser Waters

The cooling and condenser waters are generally six times the volume of the spentwash and contain very little pollution load since they are used in surface condensers.

Floor Washings

Other wastewaters originate from washing of the floors, presses, fermentation vats and other equipments.

Volume

Total wastewater volume and its pollution load vary considerably from one distillery to another for the same capacity. These variations are due to various, causes, viz -; type of fermentation and distillation, housekeeping, condition of the plant and machinery, mode of operation and water use.

The distilleries have to give more emphasis in reducing the effluent generation by incorporating various methods like adoption of continuous fermentation, providing re-boiler etc.

Characteristics of wastewater

Parameters	Spentwash	Vat cleansing	Spent lees	Floor washing	Condenser waste
pH	3.8-4.7	4.7	3.9	4.5	7.2
Alkalinity, mg/L.	4000-4,570	730	750	520	220
Total Solids, mg/L.	60000-70,000	17,830	1,000	5,900	410
Suspended solids mg/L.	10,000-14,000	14,698	300	630	Nil
C.O.D. mg/L.	70,000-90,000	61,400	1000	15,260	103
B.O.D. mg/L.	42,000-60,000	25,000	500	6,500	27
Total Nitrogen, mg/L.	500-700	144		52.6	
COD/BOD ratio	2.0	2.4	2.0	2.8	3.8

Effects of Pollution in the Natural Streams

(i) Lowering of pH value of the stream.

(ii) Increase in organic load.

(iii) Depletion of oxygen load.

(iv) Discoloration.

(v) Destruction of aquatic life.

(vi) Bad smell.

Effects of Pollution on Land

(i) Pollution of ground water.

(ii) Charring of vegetation and crops.

(iii) Accumulation of salts.

(iv) Increase in cropping period.

(v) Increase in electrical conductivity of soil.

Methods of treatment

The technology for distillery effluent treatment has evolved over time, initially during 1970's and early 1980's the main treatment for the effluent was to hold it in pits which were later substituted by a system called anaerobic lagoon by which the organic pollutants are digested by Anaerobic bacteria. During this process the lagoons used to generate odorous compounds like Hydrogen Sulphide and Methane. Then in late 1980's, the secondary treatment system was introduced, that is Anaerobic lagoon followed by aeration system. In the beginning of 1990 the open lagoons were replaced with closed Anaerobic Digesters by this the distilleries were able to recover Methane gas and use it as fuel in the boiler which has substituted the boiler fuel like furnace oil / coal and also has controlled the odour nuisance around the distilleries. As a secondary treatment, aerobic system called Activated Sludge System was introduced. Further to this during late 1990's field experiments by the agricultural universities and Indian Agricultural Research Institute have proved that the distillery effluent also called as spent wash has got liquid manure value. Taking advantage of this, experiments were conducted to convert the spent wash into solid manure using filler materials, for which the sugar factory by- product called press mud is used. Even today there is no final solution to this problem. The MOEF/CPCB/SPCB's are discussing various options to improve the situation.

(i) Biological treatment method.

The characteristics of distillery wastewater have COD/BOD ratio of 1.8 to 1.9 indicating thereby that wastewaters are amenable to biological treatment. Further, BOD/N/P ratio of 100/2.4/0.3 to 100/2.75/0.8 and high BOD of the distillery effluent indicate that anaerobic treatment methods are more suitable to any aerobic biological treatment. The various treatment processes ;

- Anaerobic lagoon in series with 120 days hydraulic retention time(not in use now)
- Anaerobic reactor, the different reactor types that are in use are: fixed bed reactor, fluidized bed reactor and sludge blanket reactor.
- Up flow anaerobic filters.
- Activated sludge system or / with extended aeration system.
- Composting with pressmud, coir pith, municipal solid waste, etc.

(ii) Evolving and Promising technologies.

- **Reverse Osmosis** of distillery effluent is now being tried by many distilleries. Of the feed volume about 50 to 60% of the filtrate with BOD of about 100 to 200 mg/l. is being tried for reuse and the filtrate containing high dissolved solids is composted along with pressmud. The treated permeate is being tried for reuse and the filtrate is subjected to composting.
- **Turbo Mist evaporator:** Recently in one of the distillery in Madhya Pradesh, Turbo Mist evaporator is established. In this system the effluent is sprayed to a height of about 200 mtrs tangentially during this spray the major part of liquid portion gets evaporated and the concentrate gets collected in the lagoon of about 200 mtrs length. This concentrate could be composted and disposed.

Disposal options

In the year 2000, the Central Pollution Control Board and the Ministry of Environment and Forest formulated a scheme for ferti-irrigation of effluents. The said scheme stipulates the standards for treating the effluents and methods of utilizing the said effluents for agricultural purposes. Subsequently during 2002 the Central Pollution Control Board recommended a protocol for bio-composting of spent wash to convert the effluents into compost. It prescribes the procedure for composting the spent wash including the technical details. In the year 2005 CPCB has issued a protocol for one time controlled land application of bio-methanated spent wash as liquid manual. The protocols are;.

(i) Protocol for utilization of distillery effluents for irrigation of agricultural crops.

(ii) Protocol for controlled land application of treated post bio-methanated distillery spent wash as liquid manure

(iii) Protocol for compost process for utilizing distillery spent wash and pressmud.

The distilleries can adopt any of the above disposal systems in combinations depending on the local conditions.

(i) Protocol for utilization of distillery effluents for irrigation of agricultural crops.

Based on the field and experimental studies carried out by the Indian Agricultural Research Institute (IARI), Delhi and the experience of the Central Pollution Control Board in application of industrial effluents on land using it as a treatment medium. The following protocols are recommended for the utilization of treated distillery effluents (BOD -100mg/l) for irrigation of agricultural crops

Basic requirements

i. Any distillery desirous of utilizing the effluent for irrigation should have completed the construction and commissioning of bio-methanation plant for primary treatment of spentwash followed by secondary biological treatment (aerobic) before utilization of land for irrigation.

The BOD value of the finally treated effluent before storage in the lined storage tank shall not exceed 500 mg/l

The BOD value of the effluent before in the storage lagoon shall not exceed 100 mg/l.

It shall not be transported to the field for irrigation through tankers

ii. The distillery shall construct concrete and lined storage tank with a minimum retention time of 1 month for storing the final treated and diluted effluent during the monsoon and/or non-irrigation period.

iii. The command area requirement for irrigation shall be calculated at the rate of not less than 9 ha/ kilolitre of daily alcohol production capacity. For 30 kld installed alcohol production capacity, the distillery will require minimum 270 ha of land for irrigation under the scheme.

iv. The distillery shall construct distribution channel network for transporting effluent, preferably of closed conduits or of pucca construction, to cover the area irrigated under the scheme.

v. The distillery after fulfilling the above basic requirements shall prepare a comprehensive **'Irrigation Management Plan' (IMP)** for utilization of its effluent and got it approved by the State Pollution Control Board at the time of grant of consent. The IMP include the details on

a. Survey/plot (khasra) numbers of land for irrigation under the scheme along with their area.

b. Written agreement with the owners (farmers) of the land mentioned in (i) above, to bring their land for use under the scheme.

c. The treated spent wash from the storage lagoon with a BOD value of 100 mg/l and TDS (inorganic) as 2100 mg/l maximum shall be utilized for irrigation.

d. The depth of one irrigation shall not be more than 10 cm or as per the crop requirement, whichever is less. The total numb er of irrigations shall not exceed **six** for any crop.

e. Agronomic plan for effective utilization of land by crop rotation.

f. Effluent distribution schedule to the fields.

g. Infrastructural facilities available/planned for collection and analysis of samples collected as per item 3 i.e. Monitoring protocol and ;

h. Full-time expert and other manpower employed for the purpose of managing the IMP.

i. The fresh water may not be allowed for dilution of spent wash treated or partially treated.

Safety protocol

- Though the crops normally cultivated in the area can be grown under the scheme, the rotation of wheat, rice and sugarcane crops is preferable.
- Effluent application during the germination and seeding growth shall be avoided.
- Any concurrent use of fertilizers and pesticides shall be done judiciously to avoid super-imposed effect.

Monitoring protocol

- The physio-chemical characteristics of the soil under irrigation by distillery effluent shall be regularly monitored for pH and Electrical Conductivity (EC). One representative sample per 10 ha at depths 30 cm and 60 cm shall be collected at least twice a year, for this purpose. The pH and EC of the extract of the mixture of 2 parts of soil with 5 parts of water shall not exceed 8.5 and 4 milli-mhos/cm respectively.
- The groundwater quality shall be monitored by installing one for hand pump for covering 10 ha area of land and one bore well for 20 ha area of land. Groundwater samples shall be collected at least once in a month and monitored for BOD, Nitrates and TDS. The net addition to the groundwater quality in terms of (i) BOD shall not exceed 3 mg/l, (ii) Nitrates, expressed as 'N' shall not exceed 10 mg/l, and (iii) TDS shall not exceed by 10% or 200 mg/l whichever is less.
- The records of soil and groundwater quality monitoring data so collected shall be properly maintained for verification by the State Pollution Control Board, at least once after every cropping season, for cross-verification by the State Pollution Control Board, at least once after every cropping season, for cross-verification.
- In the event of first observation of any of the soil and groundwater monitoring parameters exceeding the prescribed limits, effluent application shall be stopped immediately and the distillery shall communicate the matter to the State Pollution Control Board about such observation. The industry

would be solely responsible for reclamation of soil and groundwater quality at their own cost and expense, in case of damage.

(ii) Protocol for controlled land application of treated post bio-methanated distillery spent wash as liquid manure

Based on the field and experimental studies carried out by Indian Agricultural Research Institute, Delhi and Tamil Nadu Agricultural University, Coimbatore, the following protocols are recommended for the utilisation of treated Post Methanated spent wash for Pre-sown Controlled Land Application as basal manure.

Basic Requirements:

1. Any distillery desirous of utilising the spent wash for pre-sown controlled land application should use treated post bio-methanated spent wash only.

   The effluent to be utilized for one time controlled applications after post bio-methanation shall have a BOD3 27°C value not exceeding 7000 mg/l and pH should be more than 7.

2. The distillery shall engage a full time expert and other required manpower for the implementation and monitoring of controlled land application of spentwash.

3. The distillery shall construct pucca and lined storage tanks with a maximum holding capacity of 30 days for storing the spent wash during the monsoon and / or non-application period.

4. The command area for spentwash application shall be within a distance of 20 km from the distillery unit in order to facilitate easy monitoring and effective control over land application of spentwash.

5. The distillery shall either provide pipeline network or engage tanker lorries for spentwash transportation based on the location and distance of the command area meant for spentwash land application.

6. The distillery should maintain pucca records and data regarding spentwash land application. In case, tanker lorries are engaged for spentwash transportation to the field, they should carry a "Transit Card" with the following details

   a) Tanker lorry number

   b) Data / Time of loading & unloading

   c) Field address

   d) Receiving person

   e) Distance traveled

7. Infrastructure facilities should be arranged for collection and analysis of samples drawn from the application zones.

8. The distillery after fulfilling the above basic requirements shall maintain a comprehensive "Controlled Land Application Plan" for utilisation of trated post bio - methanated spentwash. The plan includes the details on

   a) Survey No. / Plot No. / Field Name of land for controlled land application along with their area/extent.

   b) The distillery shall obtain the acceptance of the farmers in the form of "Spentwash Request Application" before the application of spentwash to their land.

   c) Agronomic plan for effective utilisation of land by crop rotation.

   d) Spentwash application schedule to the fields.

9. Controlled Land Application of Treated (post bio - methanated) Spent Wash shall be carried out as described below;

   Pre-sown Controlled Land Application as basal manure:

   Treated (post bio – methanated) spent wash should be applied uniformly on land at least 20 days prior to the sowing of the crop and ploughed before raising the crops.

   The dosage of treated (post bio - methanated) spentwash for various crops is furnished in **Annexure - I.**

10. The rate of application of spentwash shall be quantified by the following techniques **(Annexure - II(a), II(b), II(c)).**

    i) Horizontal open discharge method
    ii) Measuring container
    iii) V-notch

Safety Protocol:

1. Though the crops normally cultivated in the area can be grown under the scheme, the rotation of crops is preferable.
2. Any concurrent use of fertilizers shall be done judiciously to avoid super imposed effect.

Monitoring Protocol:

1. The unit shall form an internal monitoring cell under the supervision of an agricultural graduate to closely monitor the application of treated (post bio - methanated) spent wash for controlled land application.
2. The farmers should be educated about the application of treated (post bio-methanated) spent wash for controlled land application.
3. The application of treated (post bio - methanated) spent wash on the soil should be with farmer's acceptance and transport through tankers should not cause any environmental concern.
4. Short-term and long-term monitoring must be carried out with agricultural experts. The distillery units should have their own monitoring team with renowned agricultural experts to assess the compliance status of protocol on controlled land application protocol for treated (post bio - methanated) spent wash.
5. The physico-chemical characteristics of the soil under treated (post bio - methanated) spent wash application shall be regularly monitored for pH, electrical conductivity (EC), Nitrogen (N), Sodium and Potassium (K). Once representative sample per 50 ha at depths of 30 cm and 60 cm shall be collected at least twice a year, for this purpose. The pH and EC of the extract of the mixture of 2 parts of soil with 5 parts of water shall not exceed 8.5 and 4 millimhos/cm, respectively.
6. The ground water quality shall be monitored for BOD, TDS and NO_3 by collecting one representative sample from open wells / bore wells situated in every 50 ha area of land under spentwash application atleast twice a year. The increase in BOD, TDS and NO_3 shall not exceed 3 mg/l, 200 mg/l. and 10 mg/l. over the initial results.
7. Piezometers shall be installed to study the long-term nutrient mobility in soil and its impact on ground water quality, at minimum 5 zones in the command area for continuous monitoring.
8. In the event of first observation of any of the soil and groundwater monitoring parameters exceeding the prescribed limits, the treated (post bio - methanated) spent wash application in that particular location shall be discontinued immediately and the distillery should implement corrective measures for remediation.

9. The records of soil and groundwater quality monitoring data collected shall be properly maintained for verification by the State Pollution Control Board / Central Pollution Control Board.

10. A MoU with nearby reputed agricultural university shall be entered into (prior to application of post methanated spent wash on land) for monitoring of required dose of spent wash, quality of spent wash used, monitoring of soil, ground water and productivity of crop.

11. The findings of minimum one year study by the concerned agricultural universities shall be made available by distilleries to SPCB/CPCB prior to one time controlled land application of post methanated spent wash. The report on findings will be reviewed also by the Sub-committee.

It was also decided that:

(i) The unit should obtain consent for utilization of post-methanated spent wash for one time controlled land application.

(ii) The unit should sign MoU with reputed agricultural university.

(iii) The agricultural university should also monitor the soil and ground water quality during the application phase.

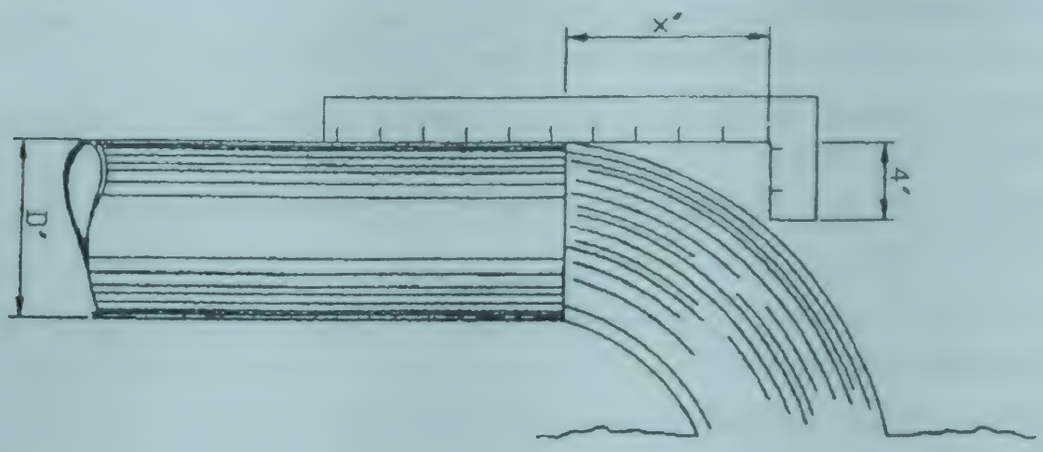
Annexure – I

Spent wash (bio - methanated) Dosage for Various Crops based on Nitrogen Requirement

Crops	Spent wash (Post bio - methanated) to be applied based on Nitrogen requirement (m3/ha)		
	Loamy Soil	Clay Soil	Sandy Soil
Sugarcane	90 – 125	80 – 115	70 – 95
Paddy	80 – 150	70 – 135	60 – 115
Maize	100 – 150	90 – 135	75 – 115
Sunflower	35 – 90	35 – 80	25 – 70
Turmeric	30 – 50	30 – 45	25 – 40
Banana	125 – 250	115 – 225	100 – 190
Cotton	70 – 80	65 – 75	55 – 60
Tobacco	60 – 70	55 – 65	45 – 55
Sorghum	35 – 90	30 – 80	25 – 70
Groundnut	35 – 90	30 – 80	25 – 70
Ragi	60 – 80	55 – 75	45 – 60
Gingelly	20 – 30	20 – 30	15 – 25
Chillies	70 – 90	65 – 80	55 – 70
Brinjal	60 – 70	55 – 65	45 – 55
Tomato	90 – 100	80 – 90	70 – 75
Onion	40 – 60	35 – 55	30 – 45

* Derived from the experimentals conducted by Tamil Nadu Agricultural University, Coimbatore at different locations of Tamil Nadu.

Annexure - II (a)
Quantification of spentwash application by horizontal open discharge method :

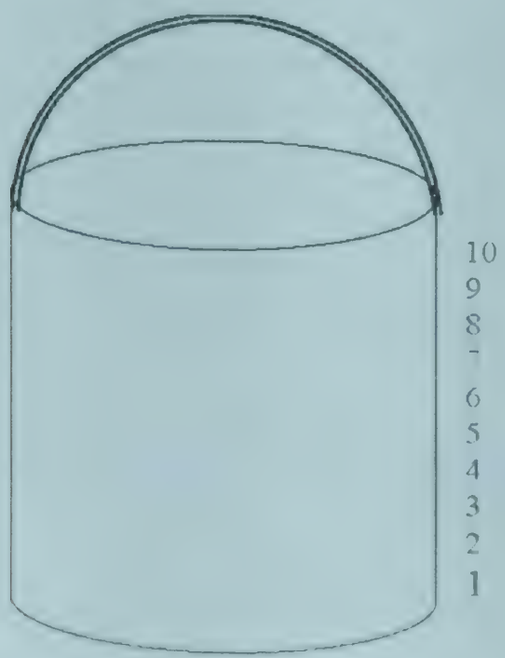


To estimate the quantity of liquid discharge, construct a 'L' shape measuring instrument similar to that shown in the accompanying sketch. The shorter side should be 4" long. The longer side may be any convenient length marked inches. With the water flowing from the horizontal open discharge, place the long side of the 'L' along the top of the discharge pipe, allowing the shorter side to hang downward as shown in the drawing. Slide the 'L' along the pipe until the 4" length barely touches the flow of water. Note the distance ('X') traveled by the flow of water before it drops 4".

Presume, for example, that the distance is 15" and the inside diameter of the pipe (indicted by 'D') is 3". Consulting the liquid discharge table, find 15" in the column at the extreme left labeled Horizontal dist. 'X' (inches). Then move horizontal to the right to the column showing the pipe diameter being used (3"). The diameter rate is found to be 49.92 m^3 per hour.

Annexure - II (b)
Quantification of spentwash application by spentwash discharge measuring container:

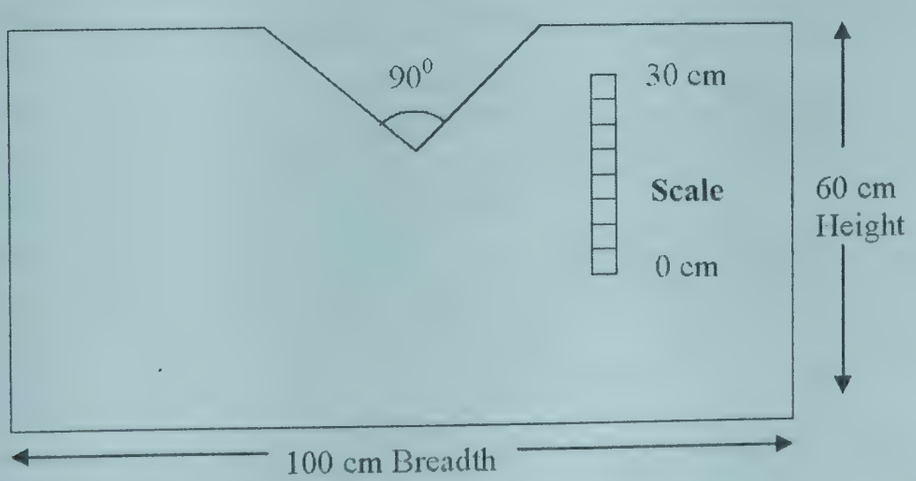
TRANSPARENT 10 LITRE CONTAINER



Time taken for 10 litre filling	Rate of discharge per hour
4 seconds	$\frac{10}{4}$ x 3600 = 9000 Ltrs.
5 seconds	$\frac{10}{4}$ x 3600 = 7200 Ltrs.
6 seconds	$\frac{10}{4}$ x 3600 = 6000 Ltrs.
7 seconds	$\frac{10}{4}$ x 3600 = 5140 Ltrs.
8 seconds	$\frac{10}{4}$ x 3600 = 4250 Ltrs.
9 seconds	$\frac{10}{4}$ x 3600 = 4000 Ltrs.
10 seconds	$\frac{10}{4}$ x 3600 = 3600 Ltrs.
11 seconds	$\frac{10}{4}$ x 3600 = 3270 Ltrs.
12 seconds	$\frac{10}{4}$ x 3600 = 3000 Ltrs.
13 seconds	$\frac{10}{4}$ x 3600 = 2760 Ltrs.
14 seconds	$\frac{10}{4}$ x 3600 = 2570 Ltrs.
15 seconds	$\frac{10}{4}$ x 3600 = 2400 Ltrs.

* To measure the spent wash discharge per hour, collect specific quantity of spent wash in the measuring container and the time taken for filling is correlated with the tables.

Annexure – II (c)
Quantification of spentwash application by 'v' notch:



Formula for measuring Liquid Flow through 'V' Notch

Quantity = 1.417 (H) $^{5/2}$ Cum/Sec ('H' in metre)

* Material of Construction of 'V' Notch : 3mm MS Plate / suitable.
* To be carried to the spentwash application filed (by the spentwash carrier vehicle).
* The 'V' Notch should be placed in such a way in the field irrigation water channel, that entire water overflows through the 'V' Notch. The height of flow to be correlated with enclosed ready reckoner chart for measurement of liquid flow to get the water flow in the irrigation water channel.

Annexure – II (c) Contd...

Chart for Measurement of Liquid Flow through 'V' Notch

Liquid Flow Height (in Cm.)	Quantity of Liquid flow (in Ltr./hour)	Quantity Rounded to nearest 100 (in Ltr./hour)
5.0	2851	2900
5.5	3618	3600
6.0	4496	4500
6.5	5494	5500
7.0	6613	6600
7.5	7859	7900
8.0	9234	9200
8.5	10746	10700
9.0	12395	12400
9.5	14184	14200
10.0	16128	16100
10.5	18216	18200
11.0	20448	20400
11.5	22874	22900
12.0	25445	25400
12.5	28177	28200
13.0	31082	31100
13.5	34160	34200
14.0	37440	37400
14.5	40680	40700
15.0	44280	44300
15.5	46800	46800
16.0	52200	52200
16.5	56160	56200
17.0	60480	60500
17.5	65340	65300
18.0	70200	70200
18.5	74880	74900
19.0	79920	79900
19.5	85320	85300
20.0	91080	91100
20.5	96840	96800

21.0	102960	103000
21.5	109080	109100
22.0	115560	115600
22.5	122400	122400
23.0	129240	129200

Annexure - III

Effluent movement studies using piezometers

Piezometers to be installed at different depths viz., 0.5, 1.0, 1.5 and 2 m depth, water samples - are collected in piezometers to be analysed for pH, EC, Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, CO3, HCO3 , $Cl^{-}$and SO4 and SAR and RSC.

(iii) Protocol for compost process for utilizing distillery spent wash and pressmud.

Utilization of distillery spentwash through bio-composting of the sugar mill pressmud is a viable option. Organic carbon and complex organic portion present in the biocompost is rich in lignins and humic acids which get converted into humus in the soil in course of time. Presence of humus in the soil has the following advantages. It holds a large quantity of water equal to several times of its weight. It improves the soil structure. It traps plant nutrients that would otherwise get leached out from the soil which are essential to plant life and are slowly released from the clay – humus complex. Hence the soil fertility is preserved. Any quantity of the chemical fertilizer cannot add humus. Solids that are devoid of humus become infertile and demand more fertilizer for every crop cycle. Moreover, the added fertilizer is leached or volatilized if humus, the holding agent of the soil is low or absent. Application of well decomposed biocompost to the soil will increase the soil fertility. Though composting is based on a sound scientific principle, it requires very careful and scrupulous monitoring. Hence, the following guidelines should be strictly followed.

- All composting processes should be done on an impervious platform as prescribed in protocol or could be on concrete platform. Pressmud should be dried to 35-40 per cent moisture level before adding spentwash. Windrows must have minimum 1 m height to augment temperature. Pressmud: spentwash ratio should be 1:2.5 (2.5m^3/t) in the case of spentwash from continuous fermentation and period of composting should be minimum of 45 days. In the case of semi-continuous or batch fermentation, it should be 1:3.5 (4 m^3/t) and period of composting should be minimum of 60 days.
- Complete degradation of the organic substrates (pressmud and distillery spentwash) should take place.
- Manual or mechanical shoveling is not adequate for complete composting. Application of partially decomposed compost on fields will not be beneficial and may lead to deterioration of soil health. Therefore use of aero tillers is recommended.
- The C : N ratio of the biocompost produced from pressmud and distillery spentwash should be in the range of 10-17. A balance sheet of solid and liquid by-products produced and utilized during the period of every 90 days should be maintained.

Composting of yeast sludge

- Like other composting processes, yeast sludge can also be used in pressmud composting. ™ Since yeast sludge has high protein and nutrients, the pressmud : yeast sludge ratio should be 4 : 1.
- Whenever it is used in admixture with spentwash, it should be 2 : 1 : 1 ratio (pressmud : yeast sludge : spentwash).
- Dried yeast sludge may also be used for direct application to land for agricultural / plantation corps.

The requirements under the protocol are as under;

SL. No.	Description	Requirements
1.	**Working days of distillery**	Maximum 270 days (rainy season shall be avoided and the entire compost area shall be kept dry before starting of the rainy period)
2.	**Spent wash Storage capacity** (duly lined with 250 micron HDPE sheet and pitched by stone/bricks with cement mortar to prevent leachate)	< 30 days
3.	**Press mud (PM) to spend Wash (SW) ratio**	1:2.5 – 1:3.5
4.	**Land required for Compost plant** Specification of floor of compost yard should be as under (with arrangement of leachate collection & surface runoff and its pumping to holding lagoon and laying of pipe net work for automatic spraying of spent wash) i. Compaction of soil ii. 5 cm local sand cushion (bottom) iii. 250 micron HDPE sheet (as per BIS specification) iv. 5 Cm sand cushion (top) v. Brick/stone soling (not less than 6 cm in case of bricks & 3 cm in case of stone soling) In case the coefficient of permeability is less than 10-8 cm/sec (as in black cotton soil) 30cm depth of impervious soil compacted with 30cm depth of murum at the top may also be used.	850 MT/acre/cycle
5.	**No. of days required to complete one cycle**	i. 45 days for 1:2.5 (PM to SW ratio) ii. 60 days for 1:3.5 (PM to SW ratio)
6.	**Maximum allowable cycles/annum**	i. 5 cycles incase of 45 days compost period. ii. 4 cycles in incase of 60 days compost period.
7.	**Land required for Storage of press mud.** In case storage area is not leakage proof (by lining with HDPE or less permeable compacted soil as specified in para 4) press mud should be transferred to compost yard before onset of rainy period and covered with HDPE/PVC sheet/ tarpaulin	Equivalent to one cycle
8.	**Land required for Storage of finished product** Land area will be raised by about 30cm above ground level. The maximum height of storage shall be 4m. The finished compost shall be kept under sheds or covered with PVC/HDPL sheet/ tarpaulin to prevent soaking from rain water	Equivalent to 33% of the total production of finished product / annum.
9.	**Compost quantity (digested spent wash)**	3.0-3.5 MT/kld of alcohol production.
10.	**Compost quality**	Moisture content : <35% Organic carbon : 20-25% Phosphorous : 1.5 - 2.0% Nitrogen : 1.5 -2.0% Potassium : 2.0-3.5% C:N ratio : <17

Equipments and Machinery Required

1.	Tractor for transportation of press mud from storage site to composting area	One
2.	Homogenizing Machine along with auto spraying system with 70 HP tractor (for churning upto the bottom)	One
3	Front end loader with tractor or JCB of bucket capacity of 600-1000 kg	One
4.	Sieving machine	One
5.	Sewing machine incase compost is to be bagged (finishing product)	One

7.4.3 ECO FRIENDLY CHROMIUM PLATING TECHNOLOGY.

Introduction

The purpose of this technology profile is to provide general information about trivalent chromium plating as a replacement for hexavalent chromium plating. Trivalent chromium is also known as tri-chrome, Cr^{+3}, and chrome (III), whereas hexavalent chromium is also known as hex-chrome, Cr^{+6}, and chrome (VI). The advantages of trichrome over hexavalent chrome is highlighted.

Chromium Plating Overview.-

The most common hexavalent chromium-bearing solutions include decorative and hard chromium, aluminum conversion coating, bright dipping of copper and copper alloys, chromic acid anodizing, and chromate conversion coatings on cadmium, zinc, silver and copper.

Hard Chromium.-

When chromium is applied for any other purpose, or when appearance is a lesser feature, the process is commonly referred to as hard chromium plating, or functional chromium plating. Chromium plating provides excellent hardness (typically 700-1,000 Vickers), bright appearance with no discoloration, and resistance to corrosive environments; it is easily applied and has a low cost. However, hexavalent chromium plating suffers from low cathode efficiency, poor metal distribution, lack of coverage around holes, and is very difficult to use in barrel plating. It is also a worker – and environment-unfriendly process.

Hexavalent Chromium Plating Technology

In the traditional hexavalent chrome plating process, the process steps are generally: activation bath, chromium bath, rinse 1 & rinse 2. The activation bath, if used, is a separate tank of chromic acid. The activation step is typically (depending on the alloy) a reverse current etch to prepare the surface of the parts to accept the plating by removing oxides from the surface of the material. Sometimes the activation step takes place in the chromium bath itself. The composition of the chromium bath is chromic acid (Cr03) and sulfate (SO4), with ratio ranging from 75:1 to 250:1 by weight. The bath is extremely acidic. The bath may be co-catalyzed with fluorides. In the chromic acid, the chromium is in the +6 oxidation state, which is reduced to Cr^{+3}, then to unstable Cr^{+2} and finally to Cr^{0}. Some Cr^{+3} is necessary in the bath to act as a reducing agent, however, concentrations of Cr^{+3} exceeding 2-3% of the chromic acid content can cause problems. (Many specifications require that this concentration not exceed 1%). The presence of other oxides of metals (e.g., iron copper, nickel) combined with the Cr^{+3} hinders bath performance.

The hexavalent oxidation state is the most toxic form of chromium which has led to it being identified by the U.S. Environmental Protection Agency (EPA) as one of 17 "high priority" toxic chemicals for voluntary reduction.

Hexavalent chromium is a known human carcinogen and is a hazardous air pollutant (HAP). The current permissible exposure limit, ceiling concentration, is 100 ug/m^3 by EPA.

Trivalent Chromium Plating Technology.-

In some applications and at certain thicknesses, trivalent chromium plating can replace hexavalent chromium. This is especially true for decorative applications where the trivalent chromium finish can closely resemble the hexavalent chromium finish. Generally, the trivalent chromium process is similar to that for hexavalent chromium except for the bath and the anode composition and/or configuration used. Trivalent chromium plating baths can be divided into the following three basic types:

1. Single electrolyte bath (chloride-or sulfate-based) using graphite or composite anodes and additives to prevent oxidation of trivalent chromium at the anodes.
2. Sulfate-based bath using shielded anodes (lead anodes surrounded by boxes filled with sulfuric acid) which prevent the trivalent chromium from reaching the anodes, thus preventing their oxidation.
3. Sulfate-based using insoluble catalytic anode that maintains an electrode potential level that preventions oxidation of the trivalent chromium.

Trivalent chromium baths overcome the shortcomings of hexavalent chromium in three general areas:

- Higher cathode efficiency
- Better throwing power
- Lower toxicity

Pollution Prevention by Trivalent Chromium Baths.-

While the use of a trivalent chromium process instead of a hexavalent chromium process is more protective to human health and the environment in and of itself, the potential pollution resulting from the trivalent chromium processes can be further reduced by using pollution prevention techniques. For example, static rinse tanks can be used to capture the drag out for return to the plating tank for reuse in the bath makeup water. In addition, the plating bath can be recycled and recovered for reuse using porous pots, membrane electrolysis, or ion exchange.

Benefits of Trivalent Chrome Plating.-

The trivalent chromium products share these benefits and challenges for potential users when compared to hexavalent chromium plating.

Lower Toxicity.-

The trivalent processes are inherently less toxic due to the oxidation state of the chromium. In addition, the trivalent chemistries also require a lower concentration of chromium in the bath, generally, 2/3 to Lounce/gal (5-7.5 g/L) of trivalent chromium compared to 17-30 ounces/gal (130-225 g/L) for hexavalent chromium. Therefore, the toxicity of the trivalent chromium plating solutions is much lower than hexavalent chromium solutions.

Worker Exposure.-

The lower toxicity of trivalent chromium combined with the lower concentration of chromium in the bath and the substantial reduction in hazardous waste sludge produced mean that less hazardous material has to be handled. In addition, substantially less air emissions are generated from the trivalent chromium process. Finally, trivalent chromium baths have a higher pH than hexavalent baths, reducing the potential for adverse damage. Therefore, the use of trivalent chromium solutions provides less potential for worker exposure.

7.4.4. INTEGRATED IRON & STEEL INDUSTRY

Raw material handling

- Use of dry fogs / dust suppression in material handling operation.
- Use of bag houses in screens/ feeders etc.

Coke oven (Recovery type)

- Hydro jet cleaning of oven doors.
- Water sealed AP cover to arrest leakages.
- High pressure liquor aspiration
- Luting of doors & lids.
- Computerized combustion control
- Use of desulphurised coke oven gas for fuel
- Use of treated waste water for coke quenching

Coke oven (Non recovery type)

- Waste heat recovery from flue gases
- Diversion of gases to adjacent oven during coal charging
- Control of oven pressure
- Use of treated water for coke quenching.

Sinter plant

- Maximize use of sludge & fines generated in steel plant
- Use of lime in sintering
- Recovery of waste heat from waste gases.

Blast Furnace

- Use of waste oils for improving the coke quality
- Direct injection of reducing agents
- Energy recovery from top gases and stove waste gases
- Use of tar free liners.
- Use of flue dust / sludge in sinter plant
- Cast house dedusting system
- Cast house slag granulation.
- Water recovery & recycle in slag granulation

Steel melting shop

- Fume extraction system for secondary emission
- Maximize BOF gas recovery .
- Recycle of sludge in sintering / pellet making.
- Recycle of scrubber water
- Use of fin fan type cooling towers for high temperature zones
- Use of blowdown water for slag quenching
- Recovery of metalics from slag for recycling.

Rolling mill

- Water to be on recirculation mode
- Use of mill scales in sinter plant
- Recovery of oil by oil skimmers (belt /drum /rope)
- Recovery of waste heat from flue gases of reheating furnaces

Others

- Vacuum cleaning of roads
- Vacuum cleaning of spillages
- Covered dust containers for transportation
- Green belt development on either side of roads & avenues
- Rain water harvesting

7.4.5. MINING

Mining in general affects the environment by way of breaking and defacing the land, removing vegetation, generating dust etc. A Rapid Environment Impact Assessment study required clearly identifies the various impacts of the mining on environment and devises mitigation measures.

(i) Storage and preservation of top soil:

Whatever the topsoil is encountered it should be selectively removed and this shall be made use for reclamation / afforestation purposes.

(ii) Reclamation of land affected by mining activities during and at the end of mining:

At the cessation of mining operations after the extraction of materials, the dumps shall be stabilized with plantation of suitable species. Plantation should also be taken up on the benches and the pits should be either back filled or made suitable for holding rainwater which will in turn help recharge the ground water as part of the rain water harvesting.

(iii) In case of mining in forest area after necessary clearances from concerned authorities aforestation program in a phased shall be planned in consultation with experts/Forest Department

(iv) Measures for dust suppression:

Deploy water tankers to suppress dust by regular water spraying on all the roads used for haulage. Dust extractors shall be put into use during drilling operation. Plantation should be done inside the lease area and along the haul roads and green belt should be developed along the lease boundary.

(v) Measures to minimize vibration due to blasting and check noise pollution:

Blasting should be done with special permission from the concerned authorities, only when absolutely necessary. The vibrations due to blasting should be minimized by careful planning, supervision and execution of each blast and using milli-second (MS) delay detonators and cord relays and proper stemming to prevent blow out of holes.

To control noise pollution in the mining operation the following steps can be practiced.

- Proper and timely maintenance of mining machinery and Crushing / Screening Plants adhering to original equipment manufacturers recommendations;
- Limiting of speed of haulage vehicles/tippers.

- Rubber lining in the chutes of Crushing / Screening Plant;
- Restriction of blast hole drilling to only day time hours and usage of sharp drilling bits and delivery of compressed air at optimal pressure during drilling;

(vi) Stabilization and Vegetation of dumps;

Static dump tops and slopes should be stabilized by planting tall saplings grass and good root bearing saplings such as Agava. Garland drains shall be made to channelize the rainwater out of the dumping area. Sufficient number of Checkdams / Toe-walls of suitable size should be constructed around the base of the dumps to prevent sliding and wash off the material.

(vii) Measures for minimizing adverse affects on water regime;

Plantation and check dams and toe-walls are an effective insulation to arrest the soil erosion at the vulnerable areas like hill slopes. This will prevent the silt making its way to natural valleys and spoiling the water regime.

(viii) Ore beneficiation : In iron ore beneficiation plant truck unloading station is the major source of dust emission. A properly designed dust separating system should be provided to suppress the dust arising out of tipping operations. The system should be simple water spray or chemical mixed water spray. The system provided should not interfere in the routine maintenance and operation of the truck unloading station.

The slime water generated during ore beneficiation from hydro cyclone should be thickened in the clari-flocculating system and the clear water could be used back for dust suppression. The underflow from the thickner having 40 to 50% solid content is to be taken to a slime pond / tailing pond of adequate capacity to hold the tailings for the life of the mine.

(ix) Transportation of ore :

- The trucks used for transportation should not be overloaded.
- Trucks should be covered with proper material.
- Spillages should be avoided during transportation.
- Instead of ore transportation over long distances it is more beneficial to convert it to pellets.

7.4.6 SANITATION IN SLAUGHTER HOUSE

There are more than 3600 authorized slaughter houses in the country. Most of them are operated and maintained by the country. Most of them are operated and maintained by municipal bodies. A large number of these slaughter houses maintain poor standards of hygiene and sanitation. It is therefore, necessary to either modernize existing slaughter houses or construct new ones. This will assist in producing safe and wholesome meat and unitisation of animal by-products besides reducing environmental pollution and cruelty to animal.

In the note guidelines are suggested to help improving existing slaughter houses and setting up of new slaughter houses on modern lines with emphasis on greater utilisation of wastes.

Terminology

Carcass	-	The part of animal body that is used for meat.
Composting	-	A controlled process involving microbial degradation
Dissolve Air Floatation	-	Separation of low density contaminant from water using minute air bubbles attached to individual particles to increase the buoyancy of the particle
Evisceration	-	The process of removing inner organs of the body, particularly organs of thorax and abdomen such as the intestine, heart, lung, liver, kidneys, etc.
Hygiene	-	The science of health and its preservation.
Incineration	-	It is a controlled combustion process in which the waste is burnt and converted into gages and a residual containing little or no combustible material.
Lairage	-	Facility of slaughter house where animals are delivered and rested prior to slaughtering.
Lard	-	Processed pig fat, processing is done by boiling raw fat material.
Offal	-	Part of the animal that remains after the carcasses have been removed.
Rendering	-	Facility for processing by-product from slaughter house and meat processing units into animal feed, bone meal etc.
Rumen	-	the first stomach of ruminants like cow, buffalo, and goat sheep which ruminates.
Slaughter House	-	The building, premises or place which is used for slaughtering of animals/birds for human consumption.
Viscera	-	The organ of the great cavity of the body which are removed after slaughtering.

Location

The slaughter houses should be located outside or on the periphery of a city or town and shall be away from an airport. Care should, however, be taken to see that these are easily accessible to the patrons and do not adversely affect the transport of meat to the market place. Main service such as portable water, electricity and proper hygienic waste disposal facilities are a prerequisite and should be taken care of.

Basic amenities

i) The slaughter house shall have the following essential facilities:

(a) Reception area for animals:
(b) Lairage:
(c) Facilities for ante-mortem inspection
(d) Segregation ward for sick/diseased animal:
(e) Carrying out humane slaughtering:
(f) Flaying, dressing and washing of carcasses:
(g) Handling carcassses and edible offal:
(h) Handling by-product:
(i) Inspection of meat and disposal of unfit meat for human consumption:
(j) Refrigerated room: and
(k) Laboratory

(iii) The floor of slaughter hall and dressing area of slaughter house must be impervious, of good quality marbled slab/cement - tiles or good quality cement concreting with paper gradient for draining wastewater. Walls up to 1.5 to 2 meters from floor should be surfaced with approved quality white glazed tiles or other equivalent material. Suitable type of ventilation system like air conditioning, air circulators, exhaust fans etc. should be provided.

(iii) The slaughter house should have an adequate separation between clean and dirty sections which shall be arranged in such a way that from introduction of a live animal into the slaughter house up to the emergence of meat and offal classed as fit for human consumption there shall be a continuous the live animals and meat and by-products or waste.

(iv) There should be rails with hooks of suitable rust proof metal for bleeding, dressing and hanging of carcasses in slaughter hose.

Operations

(i)Slaughtering: Arrangement should be provided in slaughter house for humane slaughtering. Large animals may be stunned mechanically by captive pistol or gun. In case of goat, sheep and pig, electric stunner may be used. An animal should not be stunned and slaughtered in sight of other animals.

(ii)Bleeding: The bleeding area should be so located that the blood should not be spashed on other animals being slaughtered or on carcasses being skinned. Blood drains and collection should be immediate and paper.

(iii)Dressing: Dressing of carcasses should not be done on floor. Adequate means and tools for dehiding or belting of the animal should be provided\. Hides and skins should be immediately transported either in a closed wheel barrow or by chute provided with self closing door. In no case, the hides or skins should be spread on floor for inspection. Means for immediate disposal of legs, horns, hooves etc. should be provided through spring load floor chutes or side wall door or closed wheel barrows.

(iv)Evisceration: There should be adequate contrivance for immediate separation and disposal of condemned material. Care should be taken to not to puncture intestine during evisceration to avoid contamination of carcass.

Waste supply:

(i) Suffering, safe, portable and constant supply of fresh water shall be available at adequate pressure through out the premises. There should be arrangement og hot water supply in slaughter hall and work rooms during working hour.

(ii) At all convenient points, sterilizing facilities should be provided. Hot water is required at not less than 820C for frequent sterilising of equipment and tools.

(iii) Suitable facilities for washing of hands (including adequate supply of hot and cold water, nail brushes, soap or detergent) should be provided for persons working in slaughter house.

(iv) Every sanitary convenience in a slaughter house should be supplied with water by means of suitable flushing appliance

Man power:

The workers engaged in slaughtering, dressing etc. should be well educated and trained in their respective operations. Workers should have medical check up and should be medically fit to handle meat(food). They should be provided with necessary uniform and protective clothing and they should always use and maintain them in a clean and sanitary condition through out their working period.

Inplant measures

(i) High efficiency spray nozzles with quick shot off in carcass washing, evisceration line and all cleaning purpose should be installed for effective cleaning and to reduce water consumption.

(ii) Drycleaning set up for all clean-up operations followed by controlled and efficient wet cleaning should be introduced to reduce pollution load in wastewater.

(iii) Proper segregation and collection of blood should be practiced in every slaughter house.

(iv) The dry procedure for collection of stomach and intestinal contents should be adopted. In no case, discharge of stomach and intestinal contents be allowed to discharge into drains.

(v) Hairs/feathers and other screenable solids should be removed from the wastewater as close to the place of generation/discharge as possible.

Recovery from waste

(i) Blood should be collected by pharmaceutical companies for manufacturing of haemotonic preparations. Alternative, blood plasma could be used in sausage preparations. Blood can also be converted to blood meal which, after mixing and drying with rumen digesta can be used as animal feed.

(ii) Rumen digesta contains 10-20% proteins, vitamins and essential minerals which, after processing/ drying is an ideal animal feed. Alternative, rumen digesta can be used as manure after composting.

(iii) Fat should be collected separately and rendered into tallow or lard by using wet or dry rendering processes. Indirect heat is used to melt fat and evaporate moisture from animal tissue. Tallow and lard is a valuable raw material for several chemical industries.

(iv) Dissolved air floatation (DAF) is a proven method not only for pre-treatment of wastewater but also for fat and protein recovery. Prior to floatation coagulation and flocculation are required. The collected float with solid content of 16-18% consists mainly of protein and fats. Coagulation of proteins and melting of fats is carried out in the subsequent protein recovery system consisting of a heat exchanger and dryer. The dried product with a protein content of approximately 98% can be used as animal feed.

Waste management

For implementation of effective waste management system, the slaughter houses have been classified into three categories i.e. large, medium and small. The criterion of classification is specified in Schedule -1.

Effluent : Wastewater of a slaughter house should be subjected to appropriate treatment system as given in Schedule-II to meet the prescribed standard before it is discharged. The standard are notified under the Environment (Protection) Act, 1986.

8. OTHER TOPICS

8.1. POLICY STATEMENT FOR ABATEMENT OF POLLUTION 1992

(Source: Ministry Of Environment & Forests Dtd. 26th February, 1992)

1. Preamble

The commitment of Government on abatement of pollution for preventing deterioration of the environment is stated here. The policy elements seek to shift emphasis from defining objectives for each problem area towards actual implementation, but the focus is on the long term, because pollution particularly affects the poor. The complexities are considerable given the number of industries, organisations and government bodies involved. To achieve the objectives maximum use will be made of a mix of instruments in the form of legislation and regulation, fiscal incentives, voluntary agreements, educational programmes and information campaigns. The emphasis will be on increased use of regulations and an increase in the development and application of financial incentives.

2. The Problem

2.1 There is an increasing trend in environmental pollution. Water is polluted by four kinds of substances: traditional organic waste, waste generated from industrial processes, chemical agents from fertilizers and pesticides for crop protection and silt from degraded catchments. While it is estimated that three-fourths by volume of the waste water generated is from municipal sources, industrial waste, though small in volume, contributes over one-half of the total pollutant load, and the major portion of this is coming from large and medium industries. For class-I cities of the Country, less than five per cent of the total waste water generated is collected and less than one-fourth of this is treated.

2.2 Ambient air quality trends in the major cities indicate that levels of suspended particulate matter are higher than the prescribed standards or limits, especially in summer months. Levels of nitrogen dioxide are increasing in urban centres with growing vehicle emissions.

2.3 Environmental problems are becoming larger in scale. The chemical industry generates an increasing quantity of substances every year; adversely affecting essential aspects of the composition of the atmosphere, soil and water. In the industrial high density areas, in addition to the effects on local health and impact on nature, we are confronted with damage to the social and economic functions of the environment.

2.4 With restrictions on releases to air and waste water, hazardous chemical wastes are getting diverted to land for their disposal. Earlier concerns with pollution that was visible and degradable are giving way to new types of pollution with very small quantities of synthetic chemicals that are not so visible and are injurious to health and damage the environment because of widespread use, persistence and toxicity. Reducing the hazards from toxic chemicals is now a primary public concern.

2.5 Human activities are also influencing the composition of the atmosphere. Despite uncertainties and insufficient knowledge, political and scientific decisions concerning environmental change will increasingly be necessary.

2.6 The state of the environment continues to deteriorate. The growth in scientific and technical knowledge has made it possible to use an ever increasing quantum of natural resources. The increase in population is further enhancing the pressure on the environment. The depletion of forests has been accompanied by increasing amount of pollution affecting atmosphere, soil and water. Some of the

damage is irreversible. In seeking a higher quality of life while developed countries need to focus on changing the composition of their processes and products, developing countries will need to obtain the benefits of economic growth. The policy statement on Abatement of Pollution thus complements the Forest Policy Statement. The Government seeks to ensure that its policies in every sector are based on a set of principles that harmonise economic development and environmental imperatives.

3. Future Directions and Objectives

3.1 It is not enough for the Government to notify laws which are to be complied with. A positive attitude on the part of everyone in society is essential for the prevention of pollution and wide consultation has been held with those who will ultimately implement the policy.

3.2 A comprehensive approach is taken to integrate environmental and economic aspects in development planning; stress is laid on preventive aspects for pollution abatement and promotion of technological inputs to reduce industrial pollutants; and through reliance upon public cooperation in securing a clean environment to respond to the coming challenges.

3.3 The objective is to integrate environmental considerations into decision making at all levels. To achieve this, steps have to be taken to:

- prevent pollution at source;
- encourage, develop and apply the best available practicable technical solutions;
- ensure that the polluter pays for the pollution and control arrangements;
- focus protection on heavily polluted areas and river stretches; and
- involve the public in decision making.

4. Critically Polluted Areas

4.1 Mechanisms will be evolved to reduce local concentration of pollutants in complex industrial sites. Strategies will be developed for areas with high pollution loads where the accumulative effect of the various types of pollutants would be taken into account including pollution of ground water. Existing units in these areas will be targetted for effective action. New units in these areas will be required to comply with location specific standards for stringent environmental quality objectives. These will include matching waste generators with waste buyers, with the objective of solving waste disposal.

4.2 Setting up of industrial estates, and clusters of small industrial units in rural areas, will include pollution abatement measures as an essential component of infrastructure. In the past, the absence of adequate provision of space for installing treatment facilities and arrangements for disposal of wastes has led to severe pollution of agricultural land and rivers.

4.3 There has been a steady increase in the amount of waste water produced from urban communities and industries. In the coming years, due to rapid growth in population, urbanisation, industrial development and better water supply, the amount of waste water may increase manifold. Generally, these waters are discharged into lagoons or dumped on low lying areas without any pre-treatment, thereby creating sewage pools, contaminating ground waters, salinizing good quality lands around cities, acting as a source of foul smell and breeding grounds for mosquitoes and other pathogens. At many places this waste water is discharged into drains and -rivers causing serious water pollution. However, awareness has now grown and more attention is being paid to develop systems to treat sewage waters. For a country like India, conventional treatment plants are costly. In fact, these are beyond the financial means of many small towns. Biological waste water treatment, on land disposal using suitable vegetative cover and resource recovery technologies cannot only be attractive alternative, but also economical, safe and socially acceptable.

4.4 Mining operations will not ordinarily be taken up in ecologically fragile areas. Every mining project shall be accompanied by a mining plan, including an environmental management plan and time bound reclamation programme for controlling the environmental damage and for restoration of mined areas.

5. Assistance for adoption of clean technologies by small scale industries.

5.1 Small scale industries are a special feature of our economy. Government are implementing a scheme for providing assistance for promoting combined facilities for treatment of effluents and solid wastes generated in clusters of small scale units. This scheme will be extended to provide necessary technical support as well.

5.2 While the large and medium industrial units will remain totally responsible for control of their pollution, assistance will be provided to small-scale industrial units, particularly those located in rural areas, to aid the implementation of pollution control measures. This will be achieved by promoting development and adoption of cleaner technologies, including environmentally friendly biotechnology.

6. Standards

6.1 The present standards are based on the concentration of pollutants in effluents and in emissions. The norms will be revised to lay down mass-based standards, which will set specific limits to encourage the minimization of waste, promote recycling and reuse of materials, as well as conservation of natural resources, particularly water. Since the standards will be source related, they will require for the most polluting industrial processes, particularly those using toxic substances, application of the best available technological solutions, and also be an instrument for technological upgradation.

6.2 To act against potential problems in the future, new units will have to conform to stricter standards. They will need to select technologies that produce no or low quantities of wastes and recycle or reuse waste products. Progressively, more strict vehicle emission standards will also be evolved to deal with environmental hazards caused by vehicular traffic.

6.3 Standards will not merely be a regulatory tool but will be mechanism to promote technological upgradation to prevent pollution, conserve resources and regulate waste. For this purpose codes of practice and guidelines will be evolved for specific processes.

6.4 The environmental effects, from production to disposal of products that are hazardous and toxic will be taken into account in the regulations. Chemicals will be reviewed according to the level of risk, and where safer alternatives have become available, restrictions will be imposed. Regulations for liability and compensation for damages will supplement standards, to promote greater care and caution, particularly in the management of hazardous waste and remedial action in case of contamination of soil and ground water.

7. Fiscal Measures

7.1 While regulatory measures remain essential for the effectiveness of the policy, new approaches for considering market choices will be introduced. The aim is to give industries and consumers clear signals about the cost of using environmental and natural resources. The expectation is that market-oriented price mechanisms will influence behaviour to avoid excessive use of natural resources.

7.2 There are at present several fiscal incentives for installation of pollution control equipment and for shifting polluting industries from congested areas. The items for which excise and customs rebate are allowed will be reviewed. This will stimulate the advancement of abatement technologies and create increased demands for the products.

7.3 Economic instruments will be investigated to encourage the shift from curative to preventive measures, internalise the costs of pollution and conserve resources, particularly water. A direct economic signal is offered by an effluent charge based on the nature and volume of releases to the environment. The level will be based on the cost of treatment and the flow discharged, in order to provide an incentive to set-up treatment plants. The scope of the charges will also be extended to emissions and solid waste. Charges provide a continuing incentive towards optimal releases.

7.4 These instruments will also have a distributive effect as the revenues will be used for enforcement, collective treatment facilities, research and promoting new investment.

7.5 The precise choice of economic instruments adopted will be determined by the ease with which releases can be measured, as well as prospective changes in technology and market structures. To deal with the range of pollution problems a mix of regulatory and economic measures will be adopted.

8. Integration

8.1 Critical policy areas for control of pollution come under different departments and levels of Government. Sectoral Ministries, State Governments, local bodies and agencies responsible for planning and implementation of development projects will be required to integrate environmental concerns more effectively in all policy areas. Local authorities play a key role in abatement of pollution and environmental concerns need to be built into the way they operate. Steps will have to be taken to strengthen governmental and institutional structures dealing with environmental management, especially within the ministries dealing with the sectors of energy, industry, water resources, transport and agriculture and who would develop specific programmes in regard to pollution prevention.

8.2 Policy making, legislation and law enforcement influence each other. The increase in the number of regulations increases difficulties in enforcement.Legislation regulating particular activities will be amended to incorporate and eliminate clashes with environmental criteria. Traditional instruments for monitoring of compliance and investigation of offences are becoming over-burdened. An integrated overview and organisational structure for decentralized environment impact assessments and environmental law enforcement based on cooperation with local a uthorities will be sought.

8.3 While pollution from specific sources including towns and industries have been addressed, non-point pollution from run-off of agricultural inputs such as pesticides, insecticides, fertilizers, etc. has not been dealt with. This is gaining is increasing proportions, which is polluting not only our water bodies but even sub-soil water resources and would affect the health of human beings. A long-term policy for pesticides use, including the introduction of environmentally acceptable pesticides, particularly biopesticides and non-persistent biodegradable ones, and integrated pest management together with the phasing out of the proven harmful toxic and persistent ones, would be formulated in collaboration with the concerned Ministries and infrastructure involved far its effective implementation. A similar policy for fertilizer use will also need to be formulated.

8.4 Plant and vegetation in general play a vital role in controlling pollution by regulating the climate and atmospheric equilibrium, protecting the soil and maintaining the hydrological regime. Hence, existing forests and natural vegetation should be fully protected. The forest and vegetal cover should be restored and increased wherever possible, specially on hill slopes, in catchment areas of rivers, lakes and reservoirs, ocean shores, semi-arid and arid tracts, in around urban centres and industrial establishments. It is necessary to encourage the planting of trees alongside roads, rail lines, canals and on other unutilis ed lands under State/ corporate, institutional or private ownership. Green belts should be raised in urban and industrial areas as well as in and tracts. Such a programme will also check erosion, desertification as well as improve the micro-climate.

8.5 The Annual Administration Reports of the Ministries will include a chapter on the action taken to follow up the policy statement, and other environmental initiatives they have taken or are proposing.

9. Environmental Audit

9.1 Industrial concerns and local bodies should feel that they have a responsibility for abatement of pollution. The procedure of an environmental statement will be introduced in local bodies, statutory authorities and public limited companies to evaluate the effect of their policies, operations and activities on the environment, particularly compliance with standards and the generation and recycling of waste. An annual statement will help in identifying and focussing attention on areas of concern, practices that need to be changed and plans to deal with adverse effects. This will be extended to an environmental audit. The measures will provide better information to the public.

10. Environmental Statistics

10.1 Authoritative statistical data on the environment is vital for Developmental decision making. Resource accounting will be used to give an idea how economic policies are affecting the environment. Current economic accounts are concerned mainly with the volume of economic activity; they ignore expenditures to protect the environment and encourage inefficient use of resources.

The collection and integration of environmental, economic and health data will environmental indicators for monitoring the effects of pollution Information and access to the public are essential so that everyone knows what is happening to the environment.

11. Public Partnership

11.1 The public must be made aware in order to be able to make informed choices.A high governmental priority will be to educate citizens about environmental risks, the economic and health dangers of resource degradation and the real cost of natural resources. Information about the environment will be published periodically. Affected citizens and non-governmental organisations play a role in environmental monitoring and therefore allowing them to supplement the regulatory system and recognising their expertise where such exists and their commitments and vigilance, will also be cost effective. Access to information to enable public monitoring of environmental concerns, will be provided for

11.2 Public interest litigation has successfully demonstrated that responsible non-governmental organisations and public spirited individuals can bring about significant pressure on polluting units for adopting abatement measures. This commitment and expertise will be encouraged and their practical work supported.

11.3 Householders, as consumers, make large number of relatively small individual contributions, whose cumulative effect is considerable. A system of certification of goods that are "environmentally friendly" will be set up to make available information to encourage environmental consciousness amongst consumers. This advice will also encourage manufacturers to produce goods that are environmentally more friendly as well as encourage recycling and adequate waste management. Consumer awareness would also be encouraged by involvement of consumer organisations in cooperative testing, and dissemination of information relating to environmental friendliness of these products.

11.4 As the present system of jurisprudence does not provide for compensation to individuals for environmental damage, including effects on health and environmental damage caused by pollution, it is proposed to set up special legal institutions to redress this deficiency and also make adequate arrangements for interim relief.

11.5 Greater emphasis will be placed on promoting awareness, undertaking and competence in schools, colleges, and training institutions. Professional and non-governmental bodies will be encouraged to be more active in environmental training and building awareness.

11.6 Society has accepted many practices which cause pollution. Reckless use of loudspeakers, dumping in water bodies, and scattering of wastes are common. Noise nuisance requires specific devices as well as greater consideration for neighbours and there is growing concern that litter has increased in recent years. Social action in these matters by voluntary organisations and individuals will be promoted through knowledge, education, training camps and public information campaigns.

12. This statement is based on considerations of effectiveness, efficiency and availability of financial resources. The responsibility for abatement of pollution is not the duty of the

Government alone, it is an obligation on all. The approach mentioned above should indicate how every one can help in achieving a safe and environmentally appropriate environment in our country.

8.2. E-WASTE MANAGEMENT

The electronic waste represents a growing segment of the solid waste stream which generally consists of obsolete electronic devices such as computers, serves, mainframes, monitors, TVs and display devices, telecommunication devices such as cellular phones, calculators, audio and video devices, printers, scanners, copier and fax machines, besides refrigerators, air-conditioners, washing machines, microwave ovens and toys. According to a study prepared for the USEPA, discarded electronic devices have been estimated to comprise approximately 2% of 5% of the US municipal solid waste stream (Scanlon, 2001). The EU estimates that electronic waste is growing three times faster than other waste streams. It was estimated that in 1998 alone 20 million personal computers became obsolete while more than 60 million personal computers were discarded in 2005 (US National Safety Council, 1999) On one hand, short product cycles and rapid obsolescence has apparently created demand for new products and newer users. On the other hand, new manufacturing technologies have multiplied the scales of production and thus per unit prices have fallen dramatically during the past decade worldwide.

In the Indian context, the growth in use of electronic equipment has shown an explosive upswing and the corresponding discarding of such e-wastes is also a cause for serious concern. This rise represents additional 2.5 million units in a year! India is presently the 2nd fastest growing computer market in the world after China (AEA, 2000).

Assuming conservative obsolescence rate of 5 years for personal computers, the trends show that almost 2 million PCs were discarded in India in 2005. Total waste from electronic and electrical equipment in India has been estimated to be 1,46,180 tonnes per year. This figure does not include waste electrical and electronic equipment (WEEE) imports. Clearly, we need to formulate a policy for management of e-wastes in India so that regulation of these wastes can begin in our country.

E-Waste and Environmental Legislation in India.-

India has so far enacted 14 laws for governing the country's environment, but none of these has any direct reference to e-waste or suggest in any form that it may be handled as hazardous wastes or solid wastes. However, several provisions of the Hazardous Wastes Rules, 1989 (amended further in 2000 and 2003), apply to various aspects and characteristics of e-wastes.

Schedule I of the Hazardous Wastes (Management and Handling) Rules, 1989, amended 2003 has listed some industrial process that generates hazardous waste in production as well as disposal process. These include arsenic, benzene, cadmium, lead etc. Since similar process and waste are also being used and generated in computer manufacturing; the manufacturing as well as disposal process of computer could be characterized as hazardous processes on the basis of use of carcinogenic substances used in chip production.

Schedule 2 of the above Rules, lists waste substances, which should be considered hazardous unless their concentration is less than the limit indicated in the said Schedule. The toxic substances present in desktop computer are antimony, arsenic, beryllium, cadmium, chromium, mercury, selenium, halogenated aromatic compounds and which are also listed in schedule. Thus, computer waste can be considered hazardous in nature.

Schedule 3 of the HWM&H Rules deals with import and export of hazardous waste. The E-waste related items listed in part A, list A and B of Schedule 3 of the HWM&H Amendment Rules of 2003 are given in table below:

Basel No	Description of wastes
A1180	Electrical and electronic assemblies or scraps containing components such as accumulators and other batteries, mercury-switches, glass from cathode ray tubes and other activated glass and PCB-capacitors, or contaminated with schedule 2 constituents (e.g cadmium. mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part B 1110 of this schedule.
A1090	Ashes from the incineration of insulated copper wire.
A1150	Precious metal ash from incineration of PCBs not included on list 'B'.
A2010	Glass waste from cathode ray tubes and other activated glass.
B1110	1. Electronic assemblies consisting only of metals or alloys. 2. Electrical and electronic assemblies (including printed circuit board, electronic components and wires) not valid for direct reuse but for recycling.

International initiatives for regulation of e-wastes

The Basel Convention adopted by most countries, aims to prevent damage to the environment and human health by focusing on limiting movement of hazardous (incl electronic) waste and treating it as near as possible to the point of generation

Steps have been initiated in Karnataka to evolve guidelines & also draft legislation for management of E waste by involving manufacturers, recyclers, GTZ of Germany, NGOs etc. Two recyclers have been authorized by the Board to recycle electronic wastes.

8.3 DECENTRALISED WASTEWATER TREATMENT

Only a small percentage of the sewage generated is collected/treated in small towns and cities. Though the situation in the metropolitan cities is better in terms of collection of sewage, the treatment and disposal requires a lot of improvement. Financial crunch is the main reason for this situation. To get rid of economic constraints, the cost of sewage collection and treatment are required to be reduced on one hand, and the resource value of sewage has to be fully utilized on the other hand, in addition to the restructuring tariff to the services provided by the municipalities.

Domestic wastewater management of any city consists of collection, treatment and disposal. In conventional centralized sewage treatment system, about 80% of the cost is accounted for the collection. The cost of collection of sewage and its conveyance to one terminal point in large cities is very high. Further, the depth of the sewer goes on increasing with the increase in length of sewer line and, pumping of the sewage at intermediate and terminal points requires a lot of energy.

In the field of industrial pollution control, polluter pays principle has been widely accepted. However, this principle is yet to be accepted in the matter of domestic pollution. Presently municipalities or local bodies are supposed to be fully responsible for sewerage and sewage treatment. It appears prudent to apply the polluter pays principle for domestic wastewater also, and not to leave the entire responsibility on the municipalities/local bodies.

In the decentralized treatment system, a balance between the advantages of large scale treatment in terms of economics of scale and individual responsibility for domestic wastewater treatment can be obtained by providing colony-wise/sector-wise treatment system. Responsibility of construction as well as operation and maintenance may be taken up collectively by the residential colonies/builders/developers. Specific treatment technology should be selected as per the prevailing ground situation like availability of the land, etc.

Localized or onsite treatment and its reuse is the basic approach in Decentralized Sewage Treatment System (DTS). Community is required to take up the responsibility for the domestic wastewater management in DTS. The treatment technology in DTS will vary from case to case and will depend on type of reuse/ recycling of the treated sewage.

The advantages of the decentralized treatment system include lesser cost on sewage collection and maintenance of sewerage system, cost effective treatment technology, utilization of treated sewage, easy management of the wastewater due to its lesser volume, and involvement of people/builders/developers in the wastewater treatment and management.

8.4. THE OZONE LAYER

- Ozone Molecules exist in upper atmosphere between 10 Kms to 50 Kms above the Earth. The thickness of the ozone layer is about 24 kms.
- Ozone is a triatomic allotrope of oxygen found largely in the stratosphere. It is a colourless gas, but has a pungent odour.
- "Ozone layer" is very vital, which protects the life on Earth by arresting harmful radiation from the Sun.
- If the rays are not absorbed, then the effect would be felt on human health, plants, aquatic life, and natural cycles and even on materials.
- The destruction of ozone layer is due to man-made activities.
- The phenomenon was discovered by American Scientists Dr.Sherry Rowlands and Dr.Mario Molina in 1973.

Major Causes and effects due to Ozone Layer Depletion:

- Certain stable & lighter chemicals, which are volatile in nature, can get dissociated into chlorine. These chemicals are called Ozone Depleting Substances (ODS).
- Ozone Depleting Substances (ODS) which damage the ozone layer include Chlorofluorocarbons (CFC's), Carbon tetrachloride (CTC), Methyl Chloroform and Hydrobromofluorocarbon (HCFC's) are the major ODS containing Chlorine and halons, Methyl Bromide and Hydrobromofluorocarbon (HBFC's) are the major ODS containing Bromine.
- The ODS are used for refrigerators, air conditioners, solvents, foam blowing, fire-extinguishers, dry cleaning, cleaning electronic equipment and as agricultural fumigants.
- The depletion of ozone layer allows the harmful ultraviolet rays to reach the Earth, causing skin cancer, eye cataracts, affects immune system, reduce plant yields and damage ocean ecosystem.

Government of India Regulation:

The Government of India in July 2000 has notified Ozone Depleting Substances (Regulation) Rules, 2000.

In the rules, 95 Ozone Depleting Substances are listed and these substances have been grouped into seven categories.

Various time limits have been stipulated for regulation of production & consumption of each group of Ozone Depleting Substances.

List of authorities, their fun ·tions have also been included in the rules for registration purposes.

Entrepreneurs may contact Ministry of Environment & Forests, Government of India, New Delhi for availing the multilateral fund facility

8.5 RAIN WATER HARVESTING

(Source:A.R. Shivakumar)

Introduction:

Water is essential to all life forms on earth - human, animal and vegetation. It is therefore important that adequate supplies of water be developed to sustain such life. Development of water supplies should, however, be undertaken in such a way as to preserve the hydrological balance and the biological functions of our ecosystems.

Consequently, the human endeavour in the development of water sources must be within the capacity of nature to replenish and to sustain. If this is not done, costly mistakes can occur with serious consequences. The application of innovative technologies and the improvement of indigenous ones should therefore include management of the water sources to ensure sustainability and to safeguard the sources against pollution. As land pressure rises, cities are growing vertical and in countryside more forest areas are encroached and being used for agriculture. In India the small farmers depend on Monsoon where rainfall is from June to October and much of the precious water is soon lost as surface runoff. While irrigation may be the most obvious response to drought, it has proved costly and can only benefit a fortunate few. There is now increasing interest in the low cost alternative-generally referred to as 'Rain Water Harvesting' (RWH). Water harvesting is the activity of direct collection of rainwater, which can be stored for direct use or can be recharged into the groundwater. Water harvesting is the collection of runoff for productive purposes. Rain is the first form of water that we know in the hydrological cycle, hence is a primary source of water for us.

Rivers, lakes and groundwater are all secondary sources of water. In present times, we depend entirely on such secondary sources of water. In the process, it is forgotten that rain is the ultimate source that feeds all these secondary sources and remain ignorant of its value. Water harvesting is to understand the value of rain, and to make optimum use of rainwater at the place where it falls.

Benefits of Rainwater Harvesting.-

1. Environment friendly and easy approach for water requirements
2. RWH is the ideal solution for all water requirements.
3. Increase in groundwater level.
4. Mitigates the effects of drought.
5. Reduces the runoff, which other wise flood storm water drains.
6. Reduces flooding of roads and low-lying areas.
7. Reduced soil erosion.
8. Improves the ground water quality.
9. Low cost and easy to maintain.
10. Reduces water and electricity bills.

Who can harvest rainwater? and where?

- People planning construction of House, Modification of house, existing house, etc. from rooftops
- Govt. Buildings, Institutions, Hospitals, Hotels, Shopping malls etc. from rooftops and open areas
- Farmlands, Public Parks, Playground, etc.
- Paved and unpaved areas of a layout / city / town / village

Need for rainwater harvesting.-

1. Aswater is becoming scarce, it is the need of the day to attain self-sufficiency to fulfill the water needs.
2. Asurban water supply system is under tremendous pressure for supplying water to ever increasing population.
3. Groundwater is getting depleted and polluted.
4. Soil erosion resulting from the unchecked runoff.
5. Health hazards due to consumption of polluted water.

Methods of rainwater harvesting.-

Rainwater stored for direct use in above ground or underground sumps / overhead tanks and used directly for flushing, gardening, washing etc. (Rainwater Harvesting)

Recharged to ground through recharge pits, dug wells, bore wells, soak pits, recharge trenches, etc. (Ground water recharge)

Rainwater harvesting potential.-

In an area of 2,400 Sq.ft. or 223 Sq.mt. (40 ft. X 60 ft. site) around 2,23,000 liters of rainwater can be harvested (Annual rainfall in Bangalore is around 1000 mm / 39.4 inches). The amount of rainwater that can be harvested depends on the catchment area, rainfall in that area and collection efficiency etc.

8.6. LIST OF IMPORTANT MULTILATERAL TREATIES AND OTHER AGREEMENTS IN THE FIELD OF ENVIRONMENT:

1. Protocol Amending the International convention of the High Seas Fisheries of the North Pacific Ocean, Tokyo, 1978.
2. Convention Concerning the Protection of the World Cultural and natural Heritage, Paris, 1972.
3. Convention of the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (as amended) London, Mexico City, Moscow, (Washington), 1972.
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973.
5. International Convention for the Prevention of Pollution form Ships, London, 1973.
6. Convention for the Prevention of Marine Pollution fro Land-based Sources, Paris, 1974.
7. Agreement on an International Energy Programme, Paris, 1974.
8. Convention of Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Sea Bed Mineral Resources, London, 1977.
9. Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration, Geneva, 1977.
10. Convention on the Conservation of Migratory Species of Wild animals, Bonn, 1979.
11. Convention on the Physical Protection of Nuclear Material, Vienna, 1979.
12. Convention on Long-range Transboundary Air Pollution, Geneva, 1979.
13. Protocol Concerning Cooperation in Combating Pollution Cases of Emergency, Abidjan, 1981.
14. Convention Concerning Occupational Safety and Health and the Working Environment, Geneva, 1981.
15. Protocol concerning Regional Cooperation in combating Pollution by Oil and Other Harmful Substances in Cases of Emergency, Jeddah, 1982.
16. Benelux convention on Nature Conservation and Landscape Protection, Brussels, 1982.
17. United Nations Convention on the Law of the Sea, Montego Bay, 1982.
18. International Tropical Timber Agreement, Geneva 1983.
19. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
20. Montreal Protocol on substances that Deplete the Ozone Layer, Montreal, 1987.
21. London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990.
22. Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992.
23. ASEAN Agreement on the Conservation of Nature and Natural Resources, Kuala Lumpur, 1985.

24. Agreement on the Network of Aquaculture Centers in Asia and the Pacific, Bangkok, 1988.
25. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel, 1989.
26. Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels, Geneva, 1989.
27. Convention Concerning Safety in the use of Chemicals at Work, Geneva, 1990.
28. International Convention on Oil Pollution Preparedness, Response and cooperation, London, 1990.
29. Convention on Environmental Impact Assessment in a Transboundary Context, Espoo, 1991.
30. United National Framework Convention on Climate Change, New York, 1992.
31. Convention on Biological Diversity, Rio de Janeiro, 1992.
32. Agreement establishing the south Pacific Regional Environmental Programme, Apia, 1983.
33. Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, Rome, 1983.
34. Agreement for the Establishment of the Indian Ocean Tuna commission, Rome, 1993.

8.7. INTERNATIONAL DECLARATIONS.-)

- Declaration of United Nation on the Human Environment at Stockholm- 1972
- Review of action taken on Stockholm declaration and to intensify the- actions at Global, Regional & National levels to protect and improve the Environment at Nairobi. 1982
- Declaration on Environment & Development at Rio de Janeiro - 1992
- Declaration on Protection of Marine Environment from land based - activities as Washington. 1995

8.8 GHG MITIGATION PROGRAMME

The United Nations Framework Convention on Climate Change (UNFCCC) is an international convention concerning how to address climate change. It was agreed at the Earth Summit in Rio de Janeiro, in 1992. Parties to this convention (countries) have met every year since then, resulting in a number of decisions, of which the Kyoto Protocol (1997) is the most important. In 1997 almost 200 countries signed the Kyoto Protocol. A number of things were agreed under the Protocol, but the most important were;

- Quantitative targets for greenhouse gas emissions reduction in developed countries.
- Establishing the "Kyoto Mechanisms" to assist developed countries in achieving these targets and to assist developing countries.

These targets are translated into emission allowances - or "rights to emit".

Developed countries which have ratified the Kyoto Protocol and accepted emissions reduction targets, may meet their targets through a combination of domestic climate change activities and the use of the Kyoto Mechanisms. There are three Kyoto Mechanisms:

- Joint Implementation (JI)
- Clean Development Mechanism (CDM)
- International Emissions Trading (IET)

Both JI and CDM are "project based mechanisms" and involve developing and implementing projects that reduce the green house gas emissions overseas, thereby generating carbon credits that can be sold on the carbon market. These projects are known as 'climate change projects'.

This means that a project that reduces green house gas (GHG) emissions can generate an additional income stream for the project in the form of carbon credits. International emissions trading involves trading in emissions reduction or carbon credits. So a country which has less'"rights to emit" than its actual emissions could purchase credits to overcome its shortfall.

The green house gases (GHG) covered by the Kyoto Protocol are:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Various fluorinated gases

Benefit of Indian industries:

This is a newly emerged opportunity for India which was hitherto not available, thanks to Kyoto agreement. The potential envisaged in carbon credit earning is about 203 million units (CERs) amounting to Rs. 10,000 crores annually.

The following sectors qualify for carbon credits and streamlined methodologies exist for claiming carbon credit.

1. Energy industries (renewable-/non-renewable sources)
2. Energy distribution

3. Energy demand
4. Manufacturing industries
5. Chemical industries
6. Construction
7. Transport
8. Mining/mineral production
9. Metal production
10. Fugitive emissions from fuels (solid, oil and gas)
11. Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
12. Solvent use
13. Waste handling and disposal
14. Afforestation and reforestation
15. Agriculture

We therefore strongly urge the industries to go for new projects/expand the existing capacity and adopting newer methodologies to reduce GHG emissions. The National Clean Development Mechanism Authority (NCDMA), New Delhi is considering CDM Projects. The accepted CDM projects will be submitted to different developed countries for obtaining foreign funds under carbon trading.

The accepted CDM projects will have to be registered with the UNFCCC-Executive Board. Only then developed countries will consider buying Carbon Credit (Certified Emission Reduction). One of the greatest advantage for India.

Clean Development Mechanism:

Clean Development Mechanism projects can qualify for upfront foreign investments by developed countries for getting the benefit of carbon credit after the project is implemented.

Article 12 of the Kyoto protocol defines the Clean Development Mechanism. "The purpose of the CDM shall be to assist parties not included in annex-1 in achieving sustainable development and in contributing to the ultimate objective of the convention, & to assist parties included in annex-1 in achieving compliance with their quantified.

Reason for the CDM programme:

- Non compliance of the emission reduction norms by the countries set in 1990 for the period of 2008-2012.
- To promote sustainable development in non-annex countries, by providing practically sensible benefits to such projects.
- Bringing in the concept of commodity trading-thereby CARBON being a tradable commodity in the international market-Carbon Credit.
- Thus, facilitates GHG reductions, an exciting business opportunity-Hence could to be more effective.

Purpose of the CDM:

The CDM is a duel benefit programme for cost effective GHG mitigation for dev. Countries & promoting sustainable development for the developing countries.

Facts of the CDM:

- The Kyoto Protocol has been ratified by 132 countries-entered to force on the 16th of Feb-2005.
- The overall emission gap of Japan, Canada & the old EU member countries for the 2008-2012 is 3 billion tones.

Basis for allotting CER (Certified emission reduction):

Firstly the CO2 equivalent of the GHG's is calculated-Ex-methane-21, NOx-231 etc.

- For the different technologies, the total cost of power generation per kilowatt-hour and the association CO2 (carbon dioxide) emissions are estimated.
- (COST/kw-CO2 emission/kw) for the project.

Baseline for the particular sector

- Incremental cost of CO2 = (cost/kw)/(CO2 e/Kw)

Advantage INDIA:

- One of the highest potential to provide Credits as varied no. of renewable sources.
- Prevention is better than cure-Focus on sustainable dev. Earlier than Annex-I countries.
- Additional revenue to industry.
- Efficiency improvement cost taken care by the CER revenue.
- 15 sectors already available eligible for CER.

8.9 WORLD ENVIRONMENT DAY

The United Nations Environment Programme (UNEP) invites people the world over to commemorate World Environment Day on 5th June. The aim of this annual is to raise environmental awareness and to encourage global action in the protection of the environment.

Broadly UNEP agenda is to give a human face of environmental issues, empower people to become active agents of sustainable and equitable development, promote an understanding that communities are pivotal to changing attitudes towards environmental issues, and advocate partnerships which will ensure all nations and peoples enjoy a safer and more prosperous future.

When did it all begin.-

World Environmental Day was established by the United Nations General Assembly in 1972 to mark the opening of the Stockholm Conference on the Human Environment. Another resolution adopted by General Assembly the same day lead to the creation of UNEP.

How can you celebrate World Environment Day.-

World Environment Day can be celebrated in many ways, including street rallies, bicycle parades, green concerts, essay competitions in schools, tree planting, recycling efforts, clean up campaigns and much more.

World Environment Day themes.-

Year	Theme
1974	Only one Earth
1975	Human Settlements
1976	Water: Vital Resource for Life
1977	Ozone Layer Environmental concern; Lands Loss and Soil Degradation
1978	Development Without Destruction
1979	Only one Future for our Children-Development Without Destruction
1980	A new Challenge for the New Decade, Development Without Destruction
1981	Ground Water; Toxic Chemicals in Human Food Chains
1982	Ten Years After Stockholm (Renewal of Environmental Concerns)
1983	Managing and Disposing Hazardous Waste: Acid Rain and Energy
1984	Desertification
1985	Youth: Population and the Environment
1986	A Tree of Peace
1987	Environment and Shelter: More Than a Roof
1988	When People Put the Environment First, Development Will Last
1989	Global Warming: Global Warning
1990	Children and the Environment
1991	Climate change: Need for Global Partnership
1992	Only one Earth, Care and Share

1993	Poverty and the Environment – Breaking the Vicious Circle
1994	One Earth one Family
1995	We the Peoples: United for the Global Environment
1996	Our Earth, Our Habitat, Our Home
1997	For Life on Earth
1998	For Life on Earth – Save our seas
1999	Our Earth – Our Future – Just Save it
2000	2000 The Environment Millennium – Time to Act
2001	Connect with the World Wide Web of Life
2002	Give Earth a Chance
2003	Water – Two Billion People are Dying for It!
2004	Wanted! Seas and Oceans – Dead or Alive?
2005	Green Cities – Plan for the Planet!
2006	Deserts and Desertification, Don't Desert Drylands!

8.10. MISCELLANEOUS

8.10.1. CONVERSION FACTORS

(a) Expression of Results:

(i) For Water & Wastewater Analysis:

Parts per Million

The term parts per million is a weight-to-weight ratio. Its use was more or less universal and unquestioned when analysis was principally concerned with water, because a liter of water weights approximately 1000g or 1 000 000 mg, and hence l mg/l was considered to be equal to 1 ppm. With the development and inclusion of methods for the analysis of polluted waters, such as domestic wastewater, the concept of the relation between parts per million and milligrams per liters did not change, because the specific gravity of domestic wastewater is essentially the same as that of water. As industrial wastes were included in the materials subjected to analysis, many of them were found to have specific gravities considerably different from that of water, and the close relationship between parts per million and milligrams per liter no longer applied. This discrepancy has led to abandonment of the terms parts per million in water and wastewater analysis in favour of the use of milligrams per liter.

Milligrams per Liter

Milligrams per liter is a weight-volume relationship and, because environmental engineers deal largely with liquids, it offers a convenient basis for calculation. The expression

mg/l x 8.34 = lb/million gal

is widely used and has general application. It replaces the original expression.

ppm x 8.34 = lb/million gas

Which may be safely applied to problems involving water and wastewater and other liquids whose specific gravity is essentially 1.00, but may lead to serious errors with other liquids unless correction for specific gravity is applied.

The use of milligrams per liter eliminates any opportunity for misunderstanding and confusion. In the past many results have been reported in terms of parts per million with no reference to specific gravity. Obviously the results should have been reported in milligrams per liters. Furthermore, milligrams per liters is directly applicable to the metric system.

mg/l = g/m^3

mg/l x 10^{-3} = kg/m^3

If concentration generally less than l mg/l, it may be more convenient to express results in micrograms per liter ($\mu g/l$). If concentration are greater than 10,000 mg/l the results are expressed in percent. 1% being equal to 10,000 mg/l when the specific gravity,(sp.gr) is 1.00 in solid samples and liquid wastes of high specific gravity correction has to be made if the results are expressed as parts per million (ppm) or percent by weight.

$$\text{ppm by weight} = \frac{\text{mg/l}}{\text{sp.gr.}}$$

$$\text{\% by weight} = \frac{\text{mg/l}}{10{,}000 \times \text{sp.gr.}}$$

(ii) For Air Analysis:

The concentration of suspended particles and gaseous pollutants are generally expressed as microgram per cubic meter ($\mu g/m^3$).

The relation between ppm and $\mu g/m^3$ is given by the formula.

$$1\ \mu g/m^3 = \frac{1 \text{ ppm} \times \text{molecular mass of pollutants}}{\text{l/mol at given temperature and pressure(V2)}} \times 10^3\ 1\ m^3$$

The value of l/mol at 0^0C and atmospheric pressure is equal to 22.4. at other values of temperature and pressure. Its value is governed by Avagadro's law.

The value of V2 at 20^0 C and 1 atmospheric pressure is 24.04 l/mol.

$$\text{Therefore } 1\ \mu g/m^3 \text{ of } SO2 = \frac{1 \text{ ppmx64g/mol}}{24.04/\text{l/mol}} \times 10^3\ 1\ m^3$$

$$\text{Similarly } 80\ \mu g/m^3 = \frac{SO2 \text{ in ppm} \times 64 \times 10^3}{24.04} = 0.03 \text{ ppm.}$$

8.10.2. Water Availability on earth.-

Location	Volume in Cubic Miles	Volume in Cubic km	Percentage of Total
Oceans 317,000,000	1,320,600,000	97.217	
Glaciers and ice caps	7,000,000	29,200,000	2.147
Groundwater	2,000,000	8,330,000	0.613
Saltwater lakes and inland seas	25,000	104,150	0.008
Freshwater lakes	30,000	125,000	0.009
Soil water16,000	66,660	<0.001	
Atmosphere	3,100	12,900	<0.001
Steambeds 300	1,250	<0.001	
Total	**326,074,400**	**1,358,439,960**	**99.997**

8.10.3. CHECKLIST FOR WATER/WASTEWATER SAMPLING

The following is a list of items, which should be checked before starting on a sampling mission:

Itinerary for the trip (route, stations to be covered, start and return time)
Personnel and sample transport arrangement
Area map
Sampling site location map
Icebox
Weighted bottle sampler
DO Sampler
Rope
BOD bottles
Sample containers
Special sample containers: bacteriological, heavy metals, etc.
Do fixing and titration chemicals and glassware
Thermometer
Tissue paper
Other field measurement kit, as required
Sample identification forms
Labels for sample containers
Field note book
Pen/Pencil/marker
Soap and towel
Match box
Spirit lamp
Torch
Drinking water
Knife

Note:

1. Depending on the local conditions, water body, analysis requirements etc., all items may not be necessary, or other items, not listed, may be required.
2. The number of each item that would be required depend on the number of samples of be collected. It is always safer to carry a few numbers in excess.
3. The concerned laboratory to be informed of the sample collection programme and the laboratory should be ready to receive samples particularly those which would need immediate action.

8.10.4. MAJOR CHEMICAL DISASTERS IN INDIA AFTER BHOPAL GAS TRAGEDY

Date	Place	No. of People		Nature of accident
		Killed	Injured	
Dec. 1985	Sri Ram Food and Fertilizers, Delhi	2	500	Oleum gas leak
Jul. 1987	Bhorari Industrial Area, Pune, Maharashtra	-	420	Sulphur trioxide leak
Jun. 1987	Kaluparghat, Bhuvaneshwar, Orissa	4	NA	Ammonia gas leak
Nov. 1987	Behrampur, Ahmedabad, Gujarat	-	5000	Oleum gas leak
May 1988	Deese Town, Ahmedabad, Gujarat	19	53	Acid tanker overturned
Oct. 1989	Chlorinators India, Ganjam, Orissa	6	100	Chlorine gas leak
Nov. 1990	Indian Petro Chemicals Limited Nagothane, Maharashtra	35	50	Explosion in gas cracker plant
1991	Gwalior Rayon and Silk Mills, Gwalior, Madhya Pradesh	9	100	Explosion in filling unit
Nov. 1991	Dahanu, Maharastra	100	19	Chemical explosion from overturned tanker
Apr. 1992	Naya Bazar, Delhi	12	-	Chemical explosion in warehouse
Sep. 1992	National Fertilizer Plant, Panipat, Haryana	11	11	Ammonia gas leak
Mar. 1993	Century Rayon, Sahad, Maharashtra	11	123	Sulphuric acid gas leak
Oct. 1994	Jhansi, Uttar Pradesh	30	25	Explosion in a factory

There is a sufficiency

in the world

for man's need

but not for man's greed

Mohandas K. Gandhi

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ

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